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Multi-Level Effects on Behaviour Outcomes in Canadian Children

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by
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Elisa Romano, John Hagan and Raymond Swisher

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▬

Abstract

While researchers have found evidence that Canadian neighbourhoods can have an impact on children's behaviour, *how much* they matter and *in what ways* they matter remain somewhat unclear. The first data collection cycle of the Canadian National Longitudinal Survey of Children and Youth (NLSCY), which took place in 1994-1995, was used in this study. The first part examines neighbourhood and family effects on children's physical aggression, hyperactivity-inattention, anxiety-emotional problems and prosocial behaviours. The second part of the study focuses on the effects of neighbourhoods on physical and indirect forms of aggression (e.g., gossip).

One consistent neighbourhood effect is that parents tend to characterize as more aggressive children living in neighbourhoods reported to have higher levels of problems (e.g., crime, disorder). Another finding was that poor neighbourhoods were not necessarily more likely to produce aggressive children. Also, children living in rural neighbourhoods were less likely to exhibit anxiety-emotional problems compared to children in large cities.

The study reveals that individual and family characteristics have much more of an impact on children's behaviour than neighbourhoods. Parents reported that boys were more physically aggressive, more hyperactive-inattentive, and less prosocial than girls. Older children were reported to exhibit greater anxiety-emotional problems, greater prosocial behaviours, and less hyperactivity-inattention. Family structure played a role in behaviour outcomes in that children from single-parent families were more physically aggressive, hyperactive-inattentive, and anxious-emotional than children living with both biological parents. The type of parenting reported was also related to children's behaviours, with punitive parenting having negative effects and consistent parenting having positive effects. The socioeconomic status of families was not strongly associated with children's behaviours once we took into account the family, neighbourhood, and individual factors.

This study confirms results from other studies indicating that before 12 years of age, individual and family characteristics are more strongly related to children's behaviour problems than neighbourhood characteristics. From our analyses of the first cycle of the NLSCY data, children who appear most at risk of behaviour problems are young males living in a dysfunctional family with young depressed mothers who do not live with the father.

Résumé

Bien que les chercheurs aient démontré que le voisinage peut influer sur le comportement des enfants, on ne sait pas encore exactement *jusqu'à quel point* et *de quelle façon* s'exerce cette influence. La présente étude utilise les données .recueillies au cours du premier cycle de l'Enquête longitudinale nationale sur les enfants et les jeunes (ELNEJ), qui a eu lieu en 1994-1995. La première partie de l'étude porte sur l'influence de la famille et du voisinage sur les comportements prosociaux, les troubles d'agression physique, d'hyperactivité/inattention et affectifs/de l'anxiété chez les enfants. La deuxième partie traite de l'influence du voisinage sur les formes physiques et indirectes d'agression (p. ex. le commérage).

Un effet associé de la façon consistante au voisinage est que les parents ont tendance à considérer comme plus agressifs les enfants des voisinages décrits comme ayant un niveau de problèmes élevé (p. ex. crimes et trouble). On a aussi constaté qu'il n'y avait pas nécessairement un plus grand nombre d'enfants agressifs dans les voisinages défavorisés. De plus, les enfants qui vivent dans un milieu rural sont moins susceptibles de souffrir de problèmes affectifs/d'anxiété que ceux des grandes villes.

L'étude révèle que les caractéristiques personnelles et familiales exercent une influence beaucoup plus grande sur le comportement des enfants que le voisinage. Les parents ont indiqué que les garçons sont plus souvent physiquement agressifs, qu'ils souffrent davantage de problèmes d'hyperactivité/d'inattention et qu'ils sont moins prosociaux que les filles. Les enfants plus âgés souffriraient de problèmes affectifs/d'anxiété plus importants, auraient davantage de comportements prosociaux et moins de troubles d'hyperactivité/inattention. La structure familiale a également une incidence sur le comportement des enfants. En effet, les enfants issus de familles monoparentales recourent davantage à l'agression physique et sont plus susceptibles de souffrir d'hyperactivité/inattention, et de troubles affectifs/d'anxiété que les enfants qui vivent avec leurs deux parents biologiques. L'étude établit également un lien entre les pratiques parentales et le comportement des enfants, les pratiques punitives ayant des répercussions négatives et les pratiques uniformes, des effets positifs. Une fois que l'on a pris en compte les facteurs famille, voisinage et caractéristiques personnelles, la situation socioéconomique n'apparaît pas comme un facteur qui influe fortement sur le comportement des enfants.

L'étude confirme les résultats d'autres recherches selon lesquelles avant l'âge de douze ans, les problèmes de comportement des enfants sont davantage reliés aux caractéristiques personnelles et familiales qu'aux caractéristiques du voisinage. Selon nos analyses des données du premier cycle de l'ELNEJ, les enfants qui risquent d'avoir des problèmes de comportement sont les jeunes garçons qui vivent dans une famille dysfonctionnelle avec une jeune mère dépressive et dont le père est absent.

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Executive Summary

The investigation of childhood behaviours has recently broadened to include the impact of contextual variables such as the neighbourhoods in which children live. With his influential book "The Truly Disadvantaged" William J. Wilson (1987) refocused social science attention on the role of neighbourhoods in shaping children's lives. He argued that increases in concentrated poverty have resulted in a "new urban poverty" in which today's poor children are increasingly exposed to environments characterized by economic hopelessness, community disorder, and violence - realities with far-reaching consequences for children's development (Wilson, 1997). Methodological advances (e.g., Bryk & Raudenbush, 1992; Goldstein, 1995) and improved sources of data have enabled a new generation of researchers to study neighbourhood effects on children. The emerging consensus is that neighbourhoods indeed "matter" for children yet how much they matter and the specific reasons (i.e., "how" they matter) remain somewhat unclear (for a recent review see Gephart, 1997).

While the majority of studies to date have been limited to the United States, research shows that concentrated neighbourhood poverty is also on the rise in Canadian cities (Hajnal, 1995; Hatfield, 1997). One of the problems with these U.S. studies is that many are based on restricted range samples of a single metropolitan area or disadvantaged population. The National Longitudinal Survey of Children and Youth (NLSCY) offers a unique source of data with which to examine neighbourhood effects on children across Canada. The use of the 1996 Census data to describe neighbourhood demographic and economic structures, in combination with parent and interviewer ratings of neighbourhood conditions, enabled us to assess specific characteristics of neighbourhoods assumed to influence children's behaviours. We were also able to assess the relative impact of neighbourhood, family, and individual characteristics and to identify family characteristics that best predicted childhood aggression. The spatial definition of neighbourhoods for the first study was Statistics Canada 1996 census tracts. In order to maintain adequate reliability for the neighbourhood problems and collective efficacy measures, we eliminated census tracts with less than 15 households. Our sample consisted of 96 census tracts including 1,982 families and 2,745 children aged 2 to 11 years. The second study used both census tracts and enumeration areas that have been cluster analysed to yield eight types of neighbourhoods reflecting various combinations of social class, immigration status, and family type composition.

The report is presented in two parts. The first part was a broad examination of neighbourhood and family effects on children's physical aggression, hyperactivity-inattention, anxiety-emotional problems, and prosocial behaviours. We believed that it was important to consider a wide range of behaviour outcomes as previous studies have found differing magnitudes of neighbourhood effects for emotional versus behavioural and antisocial versus prosocial outcomes. We first estimated the amount of variation in these behaviour outcomes occurring within and between neighbourhoods, families, and individuals. We then examined the relative influences of neighbourhood, family, and individual variables on this variation. The essential finding from this analysis was that across the four behaviour outcomes, the greatest amount of variation occurred between individuals, a moderate amount of variation occurred between families, and a small amount occurred between census tracts. This finding replicates the general trend of results from similar studies (see Brooks-Gunn, Duncan, & Aber, 1997a,b). The second part also focused on

aggression but distinguished between physical forms of aggression, which are more common among males, and indirect forms of aggression (e.g., gossip, social exclusion), which are more typically exhibited by females. Further, we tested for direct and mediated effects of neighbourhood objective and subjective characteristics on these forms of aggression.

Neighbourhood Effects

What do these two separate studies reveal about the role of neighbourhoods and families on Canadian children's behaviour outcomes? Using slightly different approaches, both studies found that neighbourhood characteristics had much less of an impact on children's behaviour than individual and family characteristics. One consistent finding was that children living in neighbourhoods reported to have higher levels of problems (e.g., crime, disorder) were significantly more likely to be characterized by parents as being aggressive, both physically and indirectly. Another common finding was that poor neighbourhoods in Canada were not necessarily more likely to produce aggressive children. The first study found that the percentage of families living below the poverty line was negatively associated with physical aggression, controlling for family socioeconomic status (SES) and other family and neighbourhood variables. Using a clustering (as opposed to a continuous variable) approach, the second study found that both high SES neighbourhoods and low SES neighbourhoods had lower rates of physical aggression, in comparison to middle-class neighbourhoods. In the case of indirect aggression, the second study found highest rates in enumeration areas with higher percentages of single parents and immigrants. Thus, the effect of neighbourhood SES on children's aggression is complex and may vary depending on the type of aggression measured.

Neither population size nor perceived neighbourhood cohesion was significantly related to physical aggression. However, it seems premature to conclude that neighbourhood cohesion is unrelated to children's behaviours. The cross-sectional design of the studies could have led to this insignificant result, specifically social cohesion at a single point in time may have represented a response by neighbours to existing violence and disorder, which would have cancelled out its expected protective effect. It is also possible that social cohesion is only significant when considered in combination with other neighbourhood characteristics such as SES or the presence of violence and disorder. Further, the protective effect of social cohesion may be more important for older youth that are in more direct contact with the neighbourhood. Data from subsequent NLSCY collection cycles will permit a more definitive answer to these issues.

Turning to childhood behaviour outcomes other than aggression (i.e., hyperactivity-inattention, anxiety-emotional problems, prosocial behaviour), the only neighbourhood effect reported in the first study involved population size. In particular, children living in rural neighbourhoods were less likely to exhibit anxiety-emotional problems compared to children in large cities. However, several issues should be kept in mind prior to concluding that neighbourhoods have little influence on children's behaviours. First, concerns about the study's cross-sectional nature apply here as well. Second, random effects analyses indicated more neighbourhood variation in these outcomes than for physical aggression. Almost 10% of the random variation in prosocial behaviour occurred between neighbourhoods as opposed to only 4% for physical aggression. While aggression and prosocial behaviour are sometimes correlated, they may also be theoretically independent

phenomena that require different explanatory neighbourhood variables. Research on neighbourhood effects will also need to separate empirical effects from selection processes. Selection effects may arise as families exert choice within constraints in determining where they live. If the unobserved factors that affect residential location also affect developmental outcomes of children, then the failure to include those unobserved factors in the models may lead to biased estimates, either in the form of the overestimation or underestimation of neighbourhood effects on children's outcomes

Individual and Family Effects

Results revealed that a number of individual and family variables were st. ngly associated with children's behaviours. As expected, boys were reported to be more physically aggressive and hyperactive-inattentive and less prosocial than girls. Behaviour outcomes also varied by age, specifically older children were reported to exhibit greater anxiety-emotional problems and prosocial behaviours and less hyperactivity-inattention.

Family structure played a role in behaviour outcomes in that children from single-parent families were more physically aggressive, hyperactive-inattentive, and anxious-emotional than children living with both biological parents. Indicators of family SES had few effects on children's behaviours once other family, neighbourhood, and individual characteristics were controlled. At first glance this finding might seem at odds with our previous research demonstrating a strong SES gradient for physical aggression (Tremblay et al., 1996). We believe the insignificance of family SES is partly explained by the very strong and consistent effects of parent and family social process variables, which are significantly related to family SES. For example, mothers' own psychological well-being had a strong effect on their reports of children's behaviours. Positive and hostile parent-child interactions also had an important impact on children's behaviours, with positive interactions associated with prosocial behaviour and hostile interactions associated with all negative outcomes. Likewise, parenting strategies were consistently significant covariates, with punitive parenting having detrimental effects and consistent parenting having protective effects. Thus, from a proximal perspective, parent and family characteristics likely mediated the relationship between family SES and children's behaviours and from an intergenerational perspective, parent characteristics likely led to both family SES and family characteristics (Nagin & Tremblay, 2001; Zoccolillo, 2000). Of course, intergenerational data are needed to test these hypotheses. Our limited measure of family SES at a single point in time is also an issue as it did not capture issues of onset, duration, and chronicity or their interplay with children's age.

Policy/Service Implications and Directions for Future Research

Policy makers and service providers responsible for behaviour problem prevention policies and services should consider the fact that the present study confirmed results from other studies indicating that, before age 12 years, individual and family characteristics are more strongly related to children's behaviour problems than neighbourhood characteristics. From our analyses of the first wave of the NLSCY data, children who appear most at risk of behaviour problems are young males living in a dysfunctional family with young depressed mothers who do not live with the father. However, policy makers and service providers need to keep in mind that this study is

cross-sectional, and correlates are not causes. To better understand the mechanisms that are involved in the development of these costly problems we need data over many more NLSCY waves. In most cases the causes of behaviour problems are complex and appear to build up over long periods of time. Longitudinal and experimental data are needed to understand these mechanisms. With time the NLSCY data collection cycles will allow us to more rigorously test mechanisms. Multiple data points are particularly important for modelling more complex relationships such as mediated and interactive effects. Longitudinal data will also further enable us to more properly conceptualize childhood behaviour adjustment as a developmental process that changes over time.

Because there is good evidence of intergenerational transmission of behaviour problems from the present study, and from many other longitudinal studies, the best advice to policy makers and service providers for the prevention of behaviour problems is for them to take a long-term perspective. To prevent behaviour problems one probably needs to make long-term investments in early child development through support to adolescents and young adults who are and will be the next generation of parents of young children. From this perspective, although males are those with the highest levels of problems, females with problems, apparently less serious, could be a better investment in the long run, since they are the ones most involved in providing the early environment (pre- and post-natal), which appears to be of crucial importance for the development of a brain which will be in control of an individual's behaviour.

To what extent are neighbourhood factors important? Very few studies have investigated the interactions between individual, family, and neighbourhood characteristics using appropriate methodologies. Our second study highlighted a number of interesting "ecological" relationships between neighbourhood and individual characteristics. We believe this is an important area for further investigation. For example, previous studies have suggested that females are less likely to be influenced by neighbourhoods than males. Consider the implications of such a mechanism if it were also true that mothers play the crucial role in early child development. It may be possible to address some of these issues with data from the on-going NLSCY collection cycles. However, there will always be important limits to the use of the NLSCY for the study of neighbourhood effects because there are generally too few families per neighbourhood. This problem is likely to increase with time, since many families will be moving to different neighbourhoods.

Part 1

Neighbourhood, Family, and Individual Effects on Children's Behaviour Outcomes in Canada

by

Elisa Romano, Bernard Boulerice, Raymond Swisher and Richard E. Tremblay

1.1 Introduction

Researchers have long been interested in delineating the variables that affect children's functioning and development. Our overall research objective was to investigate multi-level effects on childhood behaviour outcomes. In particular, we examined the impact of neighbourhood, family, and individual variables on mother-reported behaviours among 2-11 year old Canadian children. We determined the amount of variation in childhood behaviour outcomes occurring at the neighbourhood, family, and individual level to examine the relative influence of each level on behavioural functioning. We included four behaviour outcomes (i.e., physical aggression, hyperactivity-inattention, anxiety-emotional problems, and prosocial behaviour) to examine possible differences in the amount of variation explained at the three levels. Finally, we examined the association between a number of neighbourhood, family, and individual variables and children's behaviour outcomes.

1.1.1 Individual Effects

Past studies traditionally have focused on characteristics of the child and his or her family. Age and sex are individual-level variables that are frequently included in models of childhood behaviour outcomes. Tremblay et al. (1996) examined the effects of child's age and sex on mother-reported aggression using data from the first collection cycle (1994-1995) of the National Longitudinal Survey of Children and Youth (NLSCY). Results revealed that boys from age 4 through to 11 years had higher physical aggression scores than girls. Age increases were associated with decreases in physical aggression, which the authors attributed to family and environmental socialization factors that generally discourage the use of physical aggression. Girls from age 4 through to 11 years scored higher than boys on indirect aggression (e.g., spreading gossip, excluding someone from a group). Mothers reported an increase in indirect aggression until age 7, followed by relative stability. While the cross-sectional design of Tremblay et al.'s (1996) study limited conclusions about intra-individual change over time, longitudinal studies have also found decreased physical aggression for girls and boys from childhood to adolescence (e.g., Brame, Nagin, & Tremblay, in press; Broidy et al., 1999; Cairns & Cairns, 1994; Tremblay, 2000). While we have some data on the direct effects of age and sex on children's behaviour

outcomes, these variables often interact with other individual-, family-, and neighbourhood-level variables to influence various child outcomes.

1.1.2 Family Effects

Research on characteristics within the family that impact on childhood behaviour outcomes is abundant given that children spend much of their time within a family setting and have many of their interactions (e.g., with school) managed by family members. While a review of family characteristics was beyond the scope of this paper, we focused on family socioeconomic status (SES), family poverty, parental mental health, and parenting practices because they are commonly examined variables that were relevant to the present study.

Several studies from the first NLSCY data collection cycle of Canadian children (Boyle & Lipman, 1998; Tremblay et al., 1996; Wade, Pevalin, & Brannigan, 1999) found lower family SES to be associated with greater childhood problems, such as aggression, antisocial behaviour, conduct problems, and hyperactivity. Tremblay et al. (1996) found that 4-11 year old children from the lowest SES levels had the highest physical and indirect aggression scores. Boys had higher physical aggression scores than girls at every SES level, with the greatest sex differences found at the lower SES levels. In contrast, girls had higher indirect aggression scores than boys at every SES level, but the sex differences remained similar across levels. Two-level (individual and family) hierarchical analyses revealed that the absolute variance in physical and indirect aggression explained by family variables was 38% and 43%, respectively. Also, the total physical and indirect aggression variation between families increased as a function of decreasing SES level. These results indicated that in lower SES households, family factors played a greater role in children's use of aggressive behaviour. Boyle and Lipman (1998) also found strong family SES effects using the same NLSCY 4-11 year olds. Specifically, of the absolute variance in childhood behaviour problems associated with family and neighbourhood variables (25%), 18% was attributable to family SES relative to neighbourhood-level variables.

The effects of family SES have been demonstrated not only in cross-sectional designs such as those from the NLSCY but also in longitudinal studies beginning in early childhood (e.g., Dodge, Pettit, & Bates, 1994; Pagani, Boulerice, Tremblay, & Vitaro, 1997). Dodge et al. (1994) followed a sample of children from preschool to middle elementary school and found that SES

assessed in preschool significantly predicted teacher-reported externalizing problems and peer-rated aggression in kindergarten through to Grade 3. Boys had significantly higher peer-rated aggression scores than girls. Lower SES was also associated with a host of other family variables, including harsher parental discipline, lack of maternal warmth, and exposure to violence.

Family SES appears strongly related to family poverty, which has been linked to problematic childhood behaviours. McLoyd's (1998) literature review found that poor youth had higher rates of behaviour problems compared to peers from middle-class households, that poverty had a more pronounced impact on externalizing rather than internalizing problems, and that poverty duration was positively correlated with youth behaviour problems. The effects of poverty often are mediated by parenting practices that are harsher and more inconsistent as a result of the increased stress exerted on poor parents (Klebanov, Brooks-Gunn, & Duncan, 1994; McLeod & Shanahan, 1993; McLoyd, Ceballo, & Mangelsdorf, 1997). For example, McLeod and Shanahan's (1993) study of 4-8 year olds found that mother-reported externalizing problems were greater in poor families. However, these effects were mediated by parenting behaviours, specifically poor mothers were more physically punitive toward their children and less emotionally responsive to their children's dependency needs. These frequently punished children, in turn, were found to have more externalizing problems compared with less-punished children. Particularly among single parents, factors such as the greater likelihood of poverty, the overwhelming responsibilities of solo parenting, the increased exposure to discrete stressors (e.g., changes in job, residence), and the greater social isolation place them at increased risk for mental health problems.

Poverty appears to be associated not only with parenting practices but also with parental mental health (Klebanov et al., 1994). One frequently studied mental health problem is parental depression. Downey and Coyne's (1990) review paper found that compared with school-age children who did not have depressed mothers, children of depressed mothers exhibited more internalizing and externalizing problems and were at increased risk for affective disorders. These children also had a number of additional problems, such as higher levels of treatment for psychiatric disturbance, greater deficits in social and academic competence, and greater physical health problems. The relationship between maternal depression and children's adjustment appeared to be mediated by mother-child interactions. Specifically, Downey and Coyne (1990) found that depression decreased the amount of effort that mothers put into interacting with their

child and increased the amount of hostility and negativity directed toward the child. Depressed mothers also tended to use more coercive and punitive techniques to manage their child's behaviour. An important finding from the literature review was that these parenting difficulties were not depression-specific but rather were commonly found among mothers experiencing distress, either because of personal problems (e.g., physical illness), family difficulties (e.g., marital conflict), or neighbourhood characteristics (e.g., poverty).

Children's aggressive behaviour has also been linked with mothers' own history of childhood aggression and/or withdrawal. Serbin et al. (1998) examined the intergenerational transfer of psychological risk in a sample of women with histories of childhood aggression and/or withdrawal. Results indicated that childhood withdrawal in mothers significantly predicted aggressive behaviour in their children. Mother's childhood aggression also showed a trend in predicting their children's aggressive behaviour. Interestingly, maternal reports of their children's problem behaviours were predicted primarily by level of education, with less educated mothers reporting greater problems. The authors speculated that highly educated women may have a better understanding of child development, fewer psychiatric problems (e.g., anxiety, depression), and fewer financial and social support problems.

1.1.3 Summary

There is much existing research on the impact of families on children's functioning and development. Evidence from cross-sectional and longitudinal studies shows that low family SES is associated with a number of childhood behaviours including aggression and conduct problems. Family SES is also strongly related to poverty which impacts on childhood behaviours, especially externalizing problems. Research suggests that poverty's effects on children are often mediated by parenting practices, which are harsher and more inconsistent as a result of the increased stress exerted on poor parents. The effects of parental mental health problems (e.g., depression) on childhood behaviours are also often mediated by parenting practices that render parents less responsive and more negative toward their children.

1.1.4 Neighbourhood Effects

While most studies of children's behaviours have focused on individual and family characteristics, investigators have recently begun to incorporate variables within the child's environment. However, empirical studies on neighbourhood variables remain limited compared to those focusing on the impact of individual and family variables on behavioural outcomes. Boyle and Lipman (1998) attributed this finding partly to the fact that until recently, there were no appropriate statistical methods for analyzing multi-level (i.e., individual, family, and neighbourhood) data. It may also be that past studies lacked neighbourhood information because no such measures were administered during data collection. We also found that many of the existing neighbourhood studies used adolescent samples. This finding may be related to adolescents' greater interaction in their neighbourhoods compared to children.

Studies that have incorporated neighbourhood variables for child samples have found internalizing and externalizing problems to be linked to such neighbourhood variables as *community disadvantage*, based on measures of unemployment, poverty, and low education (Boyle & Lipman, 1998; Dubow, Edwards, & Ippolito, 1997; Wade et al., 1999), *crowded living conditions* (Chase-Lansdale & Gordon, 1996), *single-parent households* (Boyle & Lipman, 1998; Shumow, Vandell, & Posner, 1998), *low-income neighbours* (Klebanov et al., 1994; Shumow et al., 1998), *exposure to violence* (Shahinfar, Fox, & Leavitt, 2000), and *greater perceived danger and less perceived social cohesion* (Shumow et al., 1998). Reviews of the literature have found that the most consistent evidence of neighbourhood effects occurs for school-age children, that neighbourhood effects are stronger for cognitive and achievement measures than for behavioural and mental health measures, and that among the most commonly studied neighbourhood variables, SES demonstrates the most consistently powerful effects (Duncan & Raudenbush, 1999; Leventhal & Brooks-Gunn, 2000).

In addition to evidence of direct neighbourhood effects (e.g., SES, poverty) on childhood behaviour outcomes, several studies (Dubow et al., 1997; Shumow et al., 1998) have shown how neighbourhood perceptions can mediate this relationship. For example, Shumow et al. (1998) found that maternal perceptions of neighbourhood danger (e.g., drug dealers, gangs, violence) mediated the relationship between neighbourhood demographic characteristics and reports of

psychological distress and misconduct for school-age children. Furthermore, children's perceptions of neighbourhood danger mediated self-reported psychological distress. Another neighbourhood variable that has been found to mediate the relationship between neighbourhood demographics and behavioural outcomes is collective efficacy, defined as social cohesion and mutual trust among neighbours combined with their willingness to intervene on behalf of the common good. While data on childhood behaviours are currently unavailable, Sampson, Raudenbush, and Earls' (1997) study of adults living in Chicago neighbourhoods provided an important illustration of the mediating effect of collective efficacy in the relationship between neighbourhood risk (i.e., concentrated disadvantage, immigrant concentration, residential instability) and violent crime. Results indicated that neighbours' perceptions of collective efficacy showed a statistically significant negative relationship with violent crime, even after having controlled for neighbourhood risk.

1.1.5 Summary

Research on the impact of neighbourhood characteristics on children's behaviour outcomes currently is limited. The available data suggest that neighbourhood SES/poverty shows the strongest and most consistent association with behaviour problems. There is also some evidence that individuals' perceptions of neighbourhood danger and problems and their sense of social cohesion and informal social control may mediate the effects of objective neighbourhood characteristics. The influence of neighbourhoods, relative to that of families, generally is small to modest. Boyle and Lipman's (1998) study from the 1994-1995 NLSCY data collection cycle revealed that the absolute variance in 4-11 year olds' behaviour problems explained by a two-level model including neighbourhood and family variables was 25%. However, only 7% of this variance was explained by neighbourhood variables (i.e., unemployment, low income, low education, and single-parent households) while 18% was explained by family variables (i.e., poverty, single-parent status, low SES, and greater number of siblings in the family). Leventhal and Brooks-Gunn's (2000) review paper also concluded that neighbourhood variables account for approximately 5-10% of the variance in child and adolescent outcomes.

1.1.6 National Longitudinal Survey of Children and Youth

Given the importance of understanding the neighbourhood, family, and individual variables that influence child behaviour outcomes, Human Resources Development Canada initiated the National Longitudinal Survey of Children and Youth (NLSCY). The survey follows a representative sample of newborn to 11-year old Canadian children into adulthood, collecting information related to the children every two years. The objective is to develop a national database on childhood characteristics and life experiences from infancy to adulthood in order to obtain information for policy analysis and program development. The present study used data from the first NLSCY cycle (1994-1995) to examine the impact of neighbourhood, family, and individual variables on behaviour outcomes among 2-11 year old Canadian children. Similar to Boyle and Lipman (1998) who employed this data set, we investigated child-, family-, and neighbourhood-level effects on a range of child outcomes, specifically physical aggression, hyperactivity-inattention, and anxiety-emotional problems. We also expanded the scope of our investigation by including healthy prosocial behaviours (i.e., acts of helpfulness, cooperation, and encouragement of others), incorporating data for 2-3 year olds, and using subjective as well as objective neighbourhood measures.

An important difference between our study and that of Boyle and Lipman (1998) was in the operational definition of neighbourhood. Boyle and Lipman (1998) used enumeration areas (EA), which are the smallest geographic units for which census data can be easily retrieved. Each EA has a minimum of 375 households for large urban areas and a minimum of 125 households for rural areas. In contrast, we defined neighbourhoods using Statistics Canada 1996 census tracts, which represent a larger area than EAs. Because of the small area represented by EAs, there were many instances in which Boyle and Lipman (1998) only had data available for one or a few households. Using multiple family and neighbourhood variables to describe these particular EAs and examining interactions among variables creates a great deal of measurement error. Analyses using such small areas confound family- and neighbourhood-level effects, making it difficult to tease apart their separate relative impact.

1.2 Method

1.2.1 Sample and Procedure

Between 1994-1995, the NLSCY conducted its first data collection cycle on Canadian households with children aged 0 to 11 years, using a stratified, multistage probability sample design based on information collected by Statistics Canada's Labour Force Survey. One child from each household was randomly selected for the study. If there were other children in the family who fell within the specified age range, they were also randomly selected, with a maximum of four children per household. In each household, the person most knowledgeable about the child (the child's mother in 89.4% of cases) participated in a face-to-face interview during which she provided basic demographic and socioeconomic data about the family as well as extensive information (e.g., physical health, education, behaviour, social development, parenting practices) about each selected child (HRDC/STC, 1995).

Complete interview data were obtained from 13,439 households across Canada, representing an overall response rate of 86.3% and resulting in a sample of 22,831 newborn to 11-year-old children. The sample did not include children living in the two Canadian territories, in institutional facilities, and on Aboriginal reserves. We chose Statistics Canada 1996 census tracts as the spatial definition of neighbourhood. In order to maintain adequate reliability for the neighbourhood problems and collective efficacy measures (described in detail below), it was necessary to eliminate census tracts with less than 15 households (i.e., 2,671 census tracts). Our sample consisted of 96 census tracts including 1,982 families and 2,745 children aged 2 to 11 years. The sample was weighted according to NLSCY procedures.

There was an approximately equal number of girls (49.5%) and boys (50.5%) in the present study, and the average age of children was 6.53 years (SD = 2.87). Mother's average age was 33.7 years (SD = 5.7), and average level of education was 12.07 years (SD = 2.23). The majority of children (81.3%) lived with both biological parents while 17.3% lived with only one biological parent. The remaining 1.4% were in living arrangements which included neither biological parent. Approximately 12% of families had incomes below the poverty level. The average number of families in each of the 96 census tracts was 19.67 (SD = 5.95).

1.2.2 Measures

Neighbourhood (Census Tract) Predictor Variables

We used a combination of techniques to gather neighbourhood information. Statistics Canada provided the objective census tract information on the variables of area size and poverty. Mother reports related to perceptions of their neighbourhood (e.g., problems, collective efficacy) were obtained through personal interviews.

Based on Statistics Canada data, neighbourhoods were classified into one of the six following *area size* categories: urban with a population of 500,000 or over; urban with a population between 100,000-499,999; urban with a population between 30,000-99,999; urban with a population between 15,000-29,999; urban with a population less than 15,000; and rural area.

A *neighbourhood poverty* score was obtained from Statistics Canada census survey information on low-income cut-offs, a widely used though unofficial poverty measure. Scores ranged from 0 to 1, with higher scores indicating a greater proportion of families in the neighbourhood living below the poverty level.

Four items selected from the revised Simcha-Fagan Neighbourhood Questionnaire (Barnes McGuire, 1997) were used in the interviews to measure the extent of *neighbourhood problems*. Mothers rated each item along a 3-point scale from 0 (a big problem) to 2 (no problem). Negatively oriented items were reverse scored so that higher scores represented more neighbourhood problems. We evaluated the reliability of the neighbourhood problems scale through a hierarchical statistical model that assessed within- and between-neighbourhood variation. Given the categorical nature of item responses, we formulated the model in terms of the logit of the cumulative response probability, shown as

$$\text{logit}\,(\pi_{i,j,k}) = \lambda 1_i \beta 1_k + \lambda 2_i \beta 2_{j,k} + \delta_i \text{ with } \beta 1_k \sim N(0,\tau_1) \text{ and } \beta 2_{j,k} \sim N(0,\tau_2)$$

where $\pi_{i,j,k}$ represented the cumulative response probability for the i^{th} item of the j^{th} individual in the k^{th} neighbourhood. The coefficient $\lambda 1_i$ was the loading of the neighbourhood score $\beta 1_k$ and the coefficient $\lambda 2_i$ was the loading of the specific individual score $\beta 2_{j,k}$ on the i^{th} item. We incorporated different difficulty thresholds into the model by way of the coefficient δ_i. We then

extended the model by including respondent characteristics as covariates, allowing for the control of possible bias. The expanded model is

$$\text{logit}\,(\pi_{i,j,k}) = \lambda 1_i \beta 1_k + \lambda 2_i \beta 2_{j,k} + \delta_i + \Sigma_m \alpha_{i,m} X_{m,j,k}$$

The analysis revealed that of the five original neighbourhood problem items (i.e., "Litter, broken glass, or garbage in the street or road, on the sidewalk, or in yards," "Selling or using drugs," "Alcoholics and excessive drinking in public," "Groups of young people who cause trouble," and "Burglary of homes and apartments"), the burglary item did not lie on the same dimension as the other items. Frequency of burglaries showed a positive association with the level of neighbourhood income. Thus, we excluded the burglary item from the neighbourhood problems scale. Inter-subject agreement on the four remaining neighbourhood items was 0.13, yielding a reliability coefficient that ranged from 0.69 to 0.79 for neighbourhoods with 15 to 25 survey respondents, respectively (as measured by the formula $\tau_1 / [\tau_1 + \tau_2 / n_k]$). Therefore, in order to maintain an acceptable reliability level for the neighbourhood problems scale, only neighbourhoods with a minimum of 15 households were retained for analysis, resulting in 96 census tracts comprising 1,982 families.

Five items from Barnes McGuire's (1997) revised Simcha-Fagan Neighbourhood Questionnaire were used in the interviews to measure *neighbourhood collective efficacy*, which combines social cohesion (i.e., mutual trust among neighbours, sharing common values) and informal social control (i.e., neighbours can rely on one another to monitor and supervise youth). Mothers rated each item along a 3-point scale from 0 (strongly agree) to 2 (strongly disagree). Negatively oriented items were reverse scored so that higher scores represented greater collective efficacy. We conducted the same hierarchical statistical analyses for the collective efficacy scale as for the measure of neighbourhood problems. Results indicated that all five original items fell along the same dimension (i.e., "If there is a problem around here, the neighbours get together to deal with it," "There are adults in the neighbourhood that children can look up to," "People around here are willing to help their neighbours," "You can count on adults in this neighbourhood to watch out that children are safe and don't get in trouble," and "When I'm away from home, I know that my neighbours will keep their eyes open for possible trouble"). Inter-subject agreement was 0.15, yielding a reliability coefficient that ranged from 0.72 to 0.81 for neighbourhoods consisting of 15

to 25 respondents, respectively. Again, only census tracts with a minimum of 15 households were retained for subsequent analyses.

Family Predictor Variables

Sociodemographic data were gathered on mother's age and educational level as well as on household income and family status (two-parent or one-parent led).

Socioeconomic status (SES) was calculated using the method proposed by Willms and Shields (1996), which takes into account the five following variables: mother's level of education; level of education of mother's spouse; mother's occupational prestige; occupational prestige of mother's spouse; and household income. Higher scores reflected higher SES levels.

Twelve items derived from the shortened version of the Center for Epidemiological Studies Depression scale (Radloff, 1977) were used in the interviews to assess feelings of *depressed mood* over the past week, and the reliability of the measure was reported to be 0.82. Mothers rated each item (e.g., "I felt that I could not shake off the blues even with help from my family and friends") along a 4-point scale from 0 (rarely or none of the time; less than one day) to 3 (most or all of the time; 5-7 days). Higher scores indicated greater levels of depressed mood.

Twelve items based on a subscale of the McMaster Family Assessment Device (Byles, Byrne, Boyle, & Offord, 1988) were used in the interviews to gather information on various aspects of *family functioning*, namely problem solving, communication, roles, affective responsiveness, affective involvement, and behaviour control. Mothers rated each item (e.g., "We avoid discussing our fears or concerns") along a 4-point scale from 0 (strongly agree) to 3 (strongly disagree). Negatively oriented items were reverse scored so that higher scores represented greater family dysfunction. The measure had a reliability rate of 0.88.

Six items representing a shortened version of the Social Provisions Scale (Cutrona & Russell, 1987) were used in the interviews to measure various *social support* characteristics, namely guidance, reliable alliance (i.e., feeling assured that others would be available to offer practical help), and attachment. Mothers rated each item (e.g., "I have family and friends who help me feel safe, secure, and happy") along a 4-point scale from 0 (strongly disagree) to 3 (strongly agree).

Higher scores represented greater social support, and the reliability of the measure was reported to be 0.82.

Twenty-one questions adapted from the Parent Practices Scale (Strayhorn & Weidman, 1988) were used in the interviews to measure the four following *parenting behaviours*: positive interaction (n = 5) had a reliability of 0.81; hostility (n = 7) had a reliability of 0.71; consistency (n = 5) had a reliability of 0.66; and punitive parent management techniques (n = 4) had a reliability of 0.57. Mothers rated each item (e.g., "Do something special with your child that he/she enjoys") in terms of frequency from 0 (never) to 4 (many times each day). Higher scores indicated greater frequencies for each type of parenting behaviour. We calculated average scores across all children for whom mothers responded to interview questions. For example, if there were three children in the family whose ages ranged from 0-11 years, the mother answered parenting questions for each child, and the scores (coded as mother positive interaction, mother hostility, mother consistency, mother punitive parenting) represent the average level of these parenting behaviours across the three children. This measure allowed us to examine parenting behaviours primarily as a function of the mother and her interactions with all the children in the family.

Child Predictor Variables

Information was gathered on each *child's sex and age* in years.

Using the information provided by mothers on the four types of parenting behaviour, we calculated another set of scores to examine *exposure to parenting behaviours* (coded as positive interaction, hostility, consistency, punitive parenting). These scores represented the deviation in individual scores from the average across all children for whom mothers responded to interview questions. Thus, a higher score on hostile parenting, for example, indicates that a child's exposure to this type of parenting behaviour is greater than the average for all children in the family. This measure allowed us to examine parenting behaviours primarily as a function of the child and his or her particular interactions with the mother.

Child Behaviour Outcome Variables

There were slight differences in the child behaviour measures for children aged 2-3 years and those aged 4 years and older. The hierarchical linear models were adjusted for the differences in

the number of items between the 2-3 and 4-11 year old children. The four behavioural measures were developed for the NLSCY, based on measures from the Montreal Longitudinal and Experimental Study (Tremblay et al., 1991; Tremblay, Vitaro, Gagnon, Royer, & Piché, 1992) and the Ontario Child Health Study (Boyle et al., 1987). All the child behaviour outcome variables were standardized.

Six items were used in the interviews to derive *physical aggression* scores for children. Mothers rated each item (e.g., "Gets into many fights") along a 3-point scale from 0 (never or not true) to 2 (often or very true), with higher scores reflecting more physically aggressive behaviour. The measure had a reported reliability of 0.78.

Eight items were used in the interviews to measure *hyperactive-inattentive behaviours* among children. Mothers rated each item (e.g., "Cannot settle to anything for more than a few moments") along a 3-point scale from 0 (never or not true) to 2 (often or very true). Higher scores indicated higher levels of hyperactivity-inattention, and the measure had a reliability rate of 0.84.

Eight items were used in the interviews to assess children's *anxiety-emotional problems*, and the reliability of the measure was reported to be 0.79. Each item (e.g., "Seems to be unhappy, sad, or depressed") was rated along a 3-point scale from 0 (never or not true) to 2 (often or very true), with higher scores reflecting greater anxiety-emotional problems.

Ten items were used in the interviews to derive *prosocial behaviour* scores. Mothers rated each item (e.g., "Will try to help someone who has been hurt") along a 3-point scale from 0 (never or not true) to 2 (often or very true), with higher scores indicating greater prosocial behaviours. The measure had a reliability rate of 0.82.

1.2.3 Data Analyses

We used hierarchical linear modelling to statistically account for the clustering of the sampled children within families and neighbourhoods and to explicitly model the relationship between individual, family, and neighbourhood characteristics and the dependent variables (Bryk & Raudenbush, 1992; Goldstein, 1995). As such, we conducted three-level hierarchical (individual *children* nested within *families* which are nested within *neighbourhoods*) linear models for each

of the four standardized dependent variables, namely physical aggression, hyperactivity-inattention, anxiety-emotional problems, and prosocial behaviour. There were 6 child-level predictor variables (sex, age, positive interaction, hostility, consistency, punitive parenting), 11 family-level predictor variables (age, educational level, mother depressed mood, family status, SES, family dysfunction, social support, mother positive interaction, mother hostility, mother consistency, mother punitive parenting), and 4 neighbourhood-level predictor variables (area size, poverty, problems, collective efficacy). We chose variables that seemed important based on past research findings and that appeared to fit well together at a theoretical level. As such, the variables were not completely independent of one another. We did, however, test for multicollinearity and found no problems. All statistical analyses were conducted using MLnWin (Rasbash & Woodhouse, 1996).

1.3 Results

Table 1.1 presents the fixed and random effects variances for the four childhood behaviour outcomes estimated by the three-level base model controlling for child's age and sex. Given that there often are important behavioural differences in children of different ages and that most same-aged children do not belong to the same family, it was important to include child's age in the base model. Otherwise, between-family variance would mostly reflect differences between children of different ages. Similarly, the sex of a child is often associated with behavioural differences in children. Therefore, this variable was included in the base model to avoid between-family variance mostly reflecting between-sex differences.

All random effects variances achieved statistical significance, although they became increasingly smaller from individual to family to census tract level. Across the four behaviour outcomes, the greatest amount of variation occurred between individuals, a moderate amount of variation occurred between families, and a small amount occurred between census tracts. Hyperactivity-inattention had the highest percentage of variation at the individual level (76.31%), physical aggression had the highest percentage of variation at the family level (29.92%), and prosocial behaviour had the highest percentage of variation at the census tract level (9.04%).

1.3.1 Childhood Behaviour and Individual Variables

Table 1.2 presents the three-level model of fixed and random effects for the four childhood behaviour outcomes. The fixed effects estimates indicate the change in childhood behaviour that occurs from a change in child, family, or census tract variables. The random effects estimates indicate the amount of variation in childhood behaviour occurring at the individual, family, and census tract levels.

Findings for individual variables revealed that older children exhibited less hyperactivity-inattention but greater anxiety-emotional problems and prosocial behaviours. Compared with girls, boys had more mother-reported physical aggression and hyperactivity-inattention but less prosocial behaviour. Greater than average exposure to positive child-mother interactions was associated with fewer anxiety-emotional problems. Children who experienced maternal hostility at levels that were higher than the average amount for all children in the family exhibited more

physical aggression, hyperactivity-inattention, and anxiety-emotional problems and less prosocial behaviour. Finally, greater than average exposure to punitive parenting was associated with more hyperactivity-inattention and fewer anxiety-emotional problems and prosocial behaviours.

Table 1.1 **Multilevel Base (Age and Sex Included) Modelof Random Effects Variances for Childhood Behaviour Outcomes**

	Physical Aggression	Hyperactivity-Inattention	Anxiety-Emotional Problems	Prosocial Behaviour
Fixed Effects				
Intercept	0.078 (0.075)[a]	0.170 (0.076)	-0.550 (0.075)	-0.554 (0.073)
Age	-0.030 (0.009)	-0.047 (0.009)	0.067 (0.009)	0.087 (0.008)
Sex	0.196 (0.036)	0.324 (0.036)	0.029 (0.036)	-0.370 (0.033)
Random Effects[b]				
Level 1 (Individual)				
Variance	0.668 (0.029)	0.770 (0.032)	0.686 (0.029)	0.627 (0.027)
Percent of Total Variation	66.40%	76.31%	70.58%	65.18%
Level 2 (Family)				
Variance	0.301 (0.031)	0.186 (0.030)	0.234 (0.030)	0.248 (0.028)
Percent of Total Variation	29.92%	18.43%	24.07%	25.78%
Level 3 (Census Tract)				
Variance	0.037 (0.012)	0.053 (0.013)	0.052 (0.013)	0.087 (0.018)
Percent of Total Variation	3.68%	5.26%	5.35%	9.04%

Notes: a=Standard errors are in parentheses;
b=All random effects are significant at $p < .05$.

1.3.2 Childhood Behaviour and Family Variables

Table 1.2 indicates that older mothers reported less childhood physical aggression and that children from single-parent families had greater hyperactive-inattentive and anxious-emotional problems than those from two-parent households. Children from higher SES families had less hyperactivity-inattention, and mothers with greater depressed mood reported higher levels for all four behaviour outcomes. Greater family dysfunction was associated with less prosocial behaviour while greater family social support was associated with more prosocial behaviour. Mothers with higher levels of positive interaction and consistent parenting within the family reported more prosocial behaviour in their children. Consistent parenting was also associated with fewer hyperactive-inattentive problems. In contrast, greater maternal hostility was associated with more physical aggression, hyperactivity-inattention, and anxiety-emotional problems. As well, the

Table 1.2 **Multilevel Model of Fixed and Random Effects for Childhood Behaviour Outcomes**

	Physical Aggression		Hyperactivity-Inattention		Anxiety-Emotional Problems		Prosocial Behaviour	
	Estimate	T-Ratio[a]	Estimate	T-Ratio	Estimate	T-Ratio	Estimate	T-Ratio
Fixed Effects								
Intercept	-0.091 (0.504)[b]	-0.18	-0.172 (0.567)	-0.30	-0.913 (0.562)	-1.62	-2.256 (0.670)	-3.37
Child Variables								
Age	-0.015 (0.009)	-1.69	-0.031 (0.009)	-3.45*	0.067 (0.009)	7.22*	0.110 (0.009)	12.23*
Sex[c]	0.100 (0.032)	3.17*	0.229 (0.032)	7.10*	-0.029 (0.033)	-0.88	-0.330 (0.032)	-10.33*
Positive Interaction	0.013 (0.011)	1.16	0.020 (0.012)	1.71	-0.031 (0.012)	-2.60*	0.004 (0.011)	0.38
Hostility	0.164 (0.001)	16.92*	0.142 (0.010)	13.72*	0.101 (0.010)	9.62*	-0.055 (0.010)	-5.66*
Consistency	-0.008 (0.012)	-0.62	-0.016 (0.013)	-1.24	0.018 (0.013)	1.34	0.018 (0.012)	1.46
Punitive Parenting	-0.007 (0.019)	-0.36	0.048 (0.020)	2.33*	-0.055 (0.021)	-2.67*	-0.052 (0.019)	-2.70*
Family Variables								
Mother Age	-0.009 (0.004)	-2.53*	-0.006 (0.004)	-1.75	-0.001 (0.004)	-0.28	-0.002 (0.004)	-0.62
Mother Educational Level	-0.005 (0.017)	-0.29	-0.006 (0.017)	-0.36	0.005 (0.017)	0.28	0.007 (0.018)	0.43
Family Status[d]								
One biological parent	0.064 (0.050)	1.29	0.096 (0.049)	1.96*	0.110 (0.051)	2.15*	-0.017 (0.051)	-0.34
No biological parent	0.031 (0.142)	0.22	0.254 (0.141)	1.79	0.092 (0.147)	0.63	-0.175 (0.144)	-1.21
SES	-0.014 (0.034)	-0.41	-0.095 (0.034)	-2.85*	-0.004 (0.035)	-0.12	-0.028 (0.035)	-0.78
Mother Depressed Mood	0.021 (0.004)	5.44*	0.016 (0.004)	4.33*	0.026 (0.004)	6.49*	0.015 (0.004)	3.76*
Family Dysfunction	0.001 (0.005)	0.31	0.001 (0.005)	0.12	0.004 (0.005)	0.94	-0.016 (0.005)	-3.39*
Social Support	-0.008 (0.008)	-1.03	-0.010 (0.008)	-1.26	-0.003 (0.008)	-0.30	0.031 (0.008)	3.67*
Mother Positive Interaction	0.002 (0.007)	0.27	0.002 (0.007)	0.24	0.008 (0.007)	1.07	0.061 (0.007)	8.28*
Mother Hostility	0.107 (0.007)	15.91*	0.093 (0.007)	14.02*	0.096 (0.007)	13.84*	0.006 (0.007)	0.81
Mother Consistency	-0.001 (0.006)	-0.12	-0.019 (0.006)	-3.12*	0.006 (0.006)	0.94	0.029 (0.006)	4.61*
Mother Punitive Parenting	0.023 (0.011)	2.05*	0.023 (0.011)	2.12*	-0.009 (0.011)	-0.82	-0.058 (0.011)	-5.03*

Table 1.2 (continued)

	Physical Aggression		Hyperactivity-Inattention		Anxiety-Emotional Problems		Prosocial Behaviour	
	Estimate	T-Ratio[a]	Estimate	T-Ratio	Estimate	T-Ratio	Estimate	T-Ratio
Census Tract Variables								
Area Size[e]								
100,000 - 499,999	0.152 (0.087)	1.73	-0.004 (0.107)	-0.04	-0.087 (0.103)	-0.85	0.123 (0.134)	0.92
30,000 - 99,999	-0.007 (0.088)	-0.07	-0.050 (0.106)	-0.47	-0.094 (0.102)	-0.91	0.056 (0.129)	0.44
15,000 - 29,999	0.024 (0.100)	0.24	-0.130 (0.117)	-1.11	-0.160 (0.114)	-1.40	0.123 (0.141)	0.87
Urban with < 15,000	-0.073 (0.095)	-0.77	-0.079 (0.111)	-0.71	-0.112 (0.109)	-1.03	0.069 (0.134)	0.51
Rural Area	-0.007 (0.078)	-0.09	-0.092 (0.094)	-0.98	-0.206 (0.091)	-2.25*	0.070 (0.116)	0.61
Poverty	-0.445 (0.224)	-1.98*	-0.109 (0.238)	-0.46	-0.206 (0.242)	-0.85	-0.324 (0.261)	-1.24
Problems	0.124 (0.061)	2.05*	0.018 (0.073)	0.25	0.076 (0.071)	1.07	-0 050 (0.090)	-0.55
Collective Efficacy	-0.006 (0.024)	-0.26	0.008 (0.030)	0.26	0.031 (0.028)	1.09	-0.023 (0.037)	-0.63
Random Effects[f]								
Level 1 (Individual)								
Variance	0.503 (0.022)		0.571 (0.024)		0.589 (0.025)		0.503 (0.022)	
Percent of Total Variation	69.48%		77.37%		75.03%		63.43%	
Level 2 (Family)								
Variance	0.209 (0.023)		0.129 (0.022)		0.167 (0.024)		0.216 (0.023)	
Percent of Total Variation	28.87%		17.48%		21.27%		27.24%	
Level 3 (Census Tract)								
Variance	0.012 (0.006)		0.038 (0.010)		0.029 (0.009)		0.074 (0.015)	
Percent of Total Variation	1.65%		5.15%		3.70%		9.33%	

Notes: a=T-Ratio determined by dividing estimate by its standard error. Values may vary slightly because they were rounded to three decimal places;
b=Standard errors are in parentheses;
c=Reference group is girls;
d=Reference group is a family with both biological parents;
e=Reference group is urban.
f= All random effects are significant at $p<.05$.

greater the amount of punitive parenting used by mothers within the family, the higher the level of children's physically aggressive and hyperactive-inattentive behaviours and the lower the level of prosocial behaviour.

1.3.3 Childhood Behaviour and Neighbourhood Variables

Compared with living in an urban area with a population of 500,000 or more, children living in rural areas were reported to have fewer anxious-emotional problems. In neighbourhoods with a greater proportion of poor families, mothers reported less physical aggression in their children. In addition, mothers who perceived greater problems in their neighbourhood reported more childhood physical aggression (see Table 1.2).

1.3.4 Multi-Level Effects on Childhood Behaviour

Table 1.2 showed all random effects to be statistically significant. The greatest amount of variation for all four behaviour outcomes occurred between individuals, a moderate amount of variation occurred between families, and a small amount occurred between census tracts. Hyperactivity-inattention had the highest percentage of between-individual variation (77.37%), physical aggression had the highest percentage of between-family variation (28.87%), and prosocial behaviour had the highest percentage of variation occurring at the census tract level (9.33%).

To examine multi-level variation in childhood behaviour after having incorporated individual, family, and census tract variables, random effects variances in Table 1.1 were compared with those in Table 1.2. These results are presented in Table 1.3.

The total variation in *physical aggression* explained by the three-level model was 28.03% ([(0.668 + 0.301 + 0.037) - (0.503 + 0.209 + 0.012)] / [0.668 + 0.301 + 0.037]). The amount of explained variation in physical aggression increased from the individual to family to census tract levels. Thus, our findings were best able to explain the variation in physical aggression between census tracts and least able to explain the variation in physical aggression between individuals. For *hyperactivity-inattention*, the three-level model explained 26.86% of the total variation. Our results were best able to explain why families varied in hyperactivity-inattention and least able to explain individual-level variation. For *anxiety-emotional problems*, the three-level model

explained 19.24% of the total variation. Our results best explained the variation in anxiety-emotional problems between census tracts and least explained the variation between individuals. For *prosocial behaviour*, the three-level model explained 17.57% of the total variation. Our findings were best able to explain the variation between individuals and least able to explain the variation between families.

Table 1.3 **Variation in Childhood Behaviour Outcomes Associated With Individual, Family, and Census Tract**

Childhood Behaviour	Explained Variation (%)
Physical Aggression	
Three-Level Model	28.03
Individual Level (66.40)[a]	24.70
Family Level (29.92)	30.56
Census Tract Level (3.68)	67.57
Hyperactivity-Inattention	
Three-Level Model	26.86
Individual Level (76.31)	25.84
Family Level (18.43)	30.65
Census Tract Level (5.26)	28.30
Anxiety-Emotional Problems	
Three-Level Model	19.24
Individual Level (70.58)	14.14
Family Level (24.07)	28.63
Census Tract Level (5.35)	44.23
Prosocial Behaviour	
Three-Level Model	17.57
Individual Level (65.18)	19.78
Family Level (25.78)	12.90
Census Tract Level (9.04)	14.94

a=The numbers in parentheses represent the percentage of total variation from the three-level base model controlling for child's age and sex (see Table 1.1).

1.3.5 Summary

Overall results indicated that children's physical aggression was associated with characteristics of the neighbourhoods in which they lived, specifically neighbourhood poverty and perceived neighbourhood problems. Children's anxiety-emotional problems were also associated with the size of the neighbourhoods in which they lived. Despite these findings, the influence of neighbourhoods was minimal compared with that of family and individual variables. Characteristics of children's families, namely maternal age and depressed mood, family status, family SES, family dysfunction, family social support, and parenting practices, played a bigger

role in influencing children's behaviour outcomes. The age and sex of children also impacted on their behaviours. Most of the variation in children's physical aggression, hyperactivity-inattention, anxiety-emotional problems, and prosocial behaviour was at the individual level followed by the family level. Only a very small amount of the variation in childhood behaviours occurred at the neighbourhood level. Our three-level model explained the most variation in children's physical aggression and the least variation in children's prosocial behaviour.

1.4 Discussion

1.4.1 Individual and Family Influences

Our findings suggested that children's behaviour outcomes were influenced the most by their age and sex and by characteristics within their families. Mothers reported greater internalizing (i.e., anxiety-emotional) problems for older children and greater externalizing (i.e., physically aggressive, hyperactive-inattentive) problems for boys than girls. As well, children from low SES, single-parent families whose mothers were younger, had greater depressed mood, and used more hostile and punitive parenting practices were reported to exhibit more problematic behaviour. In contrast, mothers reported less hyperactivity-inattention and more prosocial behaviour for older children as well as more prosocial behaviour for girls than boys. Children from families in which there was less dysfunction, greater social support, greater maternal depressed mood, positive mother-child interactions, and non-punitive consistent parenting were reported to be more prosocial. Positive mother-child interactions and consistent parenting were also related to fewer anxiety-emotional and hyperactive-inattentive problems.

While most of the findings were consistent with existing knowledge, one surprising finding was that maternal depressed mood was associated with more prosocial behaviour. It may be that these children learn prosocial behaviours, such as helpfulness and cooperation, to help mothers whose depressed mood may limit their everyday functioning. It may also be that these children learn to behave prosocially in order to develop relationships with other individuals who can meet some of their dependency needs, which mothers may not be able to successfully accomplish as a result of their depressed mood. A third possibility is that the association between parenting behaviours (i.e., positive interaction, consistent behaviour, less punitive parenting) and greater prosocial behaviour mediated some of the risks posed by having a mother with depressed mood. Non-substantive reasons may also account for the positive association between maternal depressed mood and prosocial behaviour. For example, there is the possibility that depressed parents may report more behaviour problems in their children. Serbin et al. (1998) advised caution when interpreting the meaning of parent-reported childhood problems under such circumstances, noting that findings may reflect a combination of the child's actual behaviour problems as well the parent's distress level. Other studies (Sawyer, Streiner, & Baghurst, 1998) have found the effect

of parental distress on their reports of children's behaviour problems to be minimal and clinically insignificant.

Another surprising finding was the overall lack of significant association between family SES and childhood behaviours. It may be that the strong and consistent effects of maternal depressed mood and parenting behaviours attenuated the SES effects. This hypothesis is based on past findings showing that the relationship between family SES and youth behaviour outcomes is mediated by parental psychological well-being and parenting behaviours (Dodge et al., 1994; McLeod & Shanahan, 1993; Simons, Johnson, Beaman, Conger, & Whitbeck, 1996). As well, the hierarchical three-level models used in the study made it possible for the individual, family, and neighbourhood variables to influence not only the childhood outcome measures but also one another.

1.4.2 Neighbourhood Influences

The behavioural outcomes of children in our study were only minimally influenced by neighbourhood variables. This finding may be partly due to the fact that the children were young (2-11 years) and had limited contact with their environment, outside of the family. It may be that neighbourhood effects become more noticeable with age, as has been found in some studies of neighbourhood influences among adolescents (Aneshensel & Sucoff, 1996a; Seidman et al., 1998; Simons et al., 1996; Stiffman, Hadley-Ives, Elze, Johnson, & Dore, 1999). However, since behaviour problems have been found to decrease with age (Broidy et al., 1999; Nagin & Tremblay, 1999), neighbourhood effects on problem behaviours are likely to be complex. Our study did find that living in a rural area was associated with fewer anxiety-emotional problems and that neighbourhood poverty and problems were associated with physical aggression. Surprisingly, greater neighbourhood poverty was associated with less childhood physical aggression after having controlled for other neighbourhood and family variables. It may be that in poor neighbourhoods, parents' focus on economic concerns detracts from their ability to closely supervise and observe their children. As such, parental reports of childhood behaviour problems may be prone to greater inaccuracies as the level of neighbourhood poverty increases. Another possibility is that physical aggression may not be perceived as such in poor neighbourhoods but rather may be viewed as an adaptive response to adverse neighbourhood conditions (Kupersmidt, Griesler, DeRosier, Patterson, & Davis, 1995). Similarly, parents living in poor neighbourhoods

may have higher thresholds for identifying physical aggression problems in their children. Finally, Foster, Hagan, Boulerice, and Tremblay (2001) used the same NLSCY data set but a clustering variable approach to show that very high SES neighbourhoods (i.e., low poverty) were associated with less childhood physical aggression compared with middle-class neighbourhoods. This finding, along with that of the present study, suggests that the effects of neighbourhood poverty on childhood aggression may be curvilinear.

1.4.3 Policy and Research Considerations

The scope of investigation into variables that influence children's behaviours has recently broadened from the traditional focus on a child's family to characteristics within the child's neighbourhood. Findings from our study indicated that neighbourhoods had an impact on child outcomes in that approximately 4-9% of the variation in problem and prosocial behaviours was associated with neighbourhood variables. However, neighbourhood effects were minimal relative to those associated with a child's family composition (e.g., single-parent household), family functioning (e.g., parenting practices), and parental psychological health (e.g., maternal depressed mood). These results are similar to studies that have compared school effects to individual and family effects (e.g., Willms, 1999).

Our findings would suggest that policy efforts aimed at decreasing problematic and promoting prosocial behaviours among 2-11 year old children should place greater emphasis on families, in particular parental difficulties related to financial stress and psychological well-being and to ways of disciplining and interacting with their children. While our study found a number of associations between family variables and children's behaviours, it seems important to remember that these variables are most likely linked with one another, with other family variables, and with child variables (e.g., age, sex) in a number of significant and sometimes complex ways. As well, Boyle and Lipman (1998) noted that some family characteristics (e.g., SES) are difficult to separate from those at the neighbourhood level (e.g., poverty, unemployment).

While our study found a limited neighbourhood impact on children's behaviours, research is still in the early stages and as such, there are several future research considerations. We defined neighbourhoods using data at the census tract level. Compared with previous research that examined smaller catchment areas (enumeration areas; Boyle & Lipman, 1998), our purpose in

using a larger more heterogeneous neighbourhood definition was to reduce measurement error so that we could more clearly differentiate family and neighbourhood effects. However, this adjustment still resulted in only a few significant neighbourhood effects. Brooks-Gunn, Duncan, Klebanov, and Sealand (1993), who also defined neighbourhoods using the census tract, wondered whether this spatial unit was too large, too small, or too incongruent with the relevant neighbourhood environment of their sample. They noted that a number of neighbourhood size variables may also influence behaviour, such as the density of people residing in an area and the availability of public transportation.

There clearly are conceptual challenges associated with examining neighbourhood effects. First, there is no single operational definition of neighbourhood, with definitions typically being guided by the particular issue under investigation (Gephart, 1997; Jarrett, 1997). Second, there are various ways in which neighbourhood effects may be revealed. Boyle and Willms (1999) noted that neighbourhood differences may be the result of real contextual effects or artificial compositional effects, namely differences in inhabitant characteristics. As well, there may be interactions between individuals and their neighbourhoods so that each is influenced by the other. Our study, like many previous ones, used administrative boundaries to spatially define neighbourhoods. It has been suggested (Boyle & Lipman, 1998; Boyle & Willms, 1999) that this approach results in a great deal of heterogeneity which, in turn, makes it difficult to detect neighbourhood effects. Boyle and Lipman (1998) stated that the "next generation of studies into neighbourhood effects would be well served by linking census data to spatial boundaries that minimize within place heterogeneity of the hypothesized risk factors for study, such as neighbourhood disadvantage" (p. 31).

Policy makers and service providers who would want to use results from this study to decide on behaviour problem prevention policies and services should consider the fact that individual and family characteristics are most strongly related to children's behaviour problems. Children most at risk of behaviour problems are young males living in a dysfunctional family with young depressed mothers who do not live with the father. Thus, to substantially reduce the level of behaviour problems in our society, one is tempted to target these characteristics. However, correlates are not causes. We need to understand the mechanisms that are involved. Spending our resources on correlates (which are not causal factors) would be a waste of money. In most cases, the causes of

behaviour problems are complex and appear to build up over long periods of time. Longitudinal and experimental data are needed to understand these mechanisms. With time, the NLSCY data collection cycles will allow us to more rigorously test mechanisms. Multiple data points are particularly important for modelling more complex relationships such as mediated and interactive effects. Longitudinal data will also further enable us to more properly conceptualize childhood behaviour adjustment as a developmental process that changes over time.

Because there is good evidence of intergenerational transmission of behaviour problems from the present study, and from many other longitudinal studies, the best advice to policy makers and service providers for the prevention of behaviour problems is for them to take a long-term perspective. To prevent behaviour problems, one probably needs to make long-term investments in early child development through support to adolescents and young adults who are and will be the next generation of parents of young children. From this perspective, although males are those with the highest levels of problems, females with problems (apparently less serious) could be a better investment in the long run, since they are the ones most involved in providing the early environment (pre- and post-natal) which appears to be of crucial importance for the development of a brain which will be in control of an individual's behaviour.

1.4.4 Limitations

Our study's use of a cross-sectional design did not allow for causal conclusions to be reached. One of the goals of the NLSCY, from which our data were derived, is to collect information on children every two years until adulthood. As such, we will be able to address important issues related to predictors of children's behaviour outcomes in future reports. Another limitation in the present study was the sole use of maternal reports, which are subject to biases, to assess children's problem and prosocial behaviours. The NLSCY also intends to collect information from children's teachers so we will be able to examine the issue of informant differences and bias in future reports. Third, our study used static conceptualizations of such variables as family composition and poverty. Past research (McLeod & Shanahan, 1993) has demonstrated that variable histories, such as poverty duration, may have important links with children's mental health functioning. Finally, we did not examine possible interactions associations between and among individual, family, and neighbourhood variables that may impact on childhood behaviour outcomes.

Part 2

Neighbourhood and Family Contexts of Gendered Aggression

by

Holly Foster, John Hagan, Richard E. Tremblay and Bernard Boulerice

2.1. Introduction

Sociological crime and delinquency research has been restrictive in focusing on direct predatory forms of physical aggression among adolescents and adults. In contrast, psychological research (Lagerspetz, Bjorkqvist, & Peltonen, 1988; Pepler & Sedighdeilami, 1998; Tremblay, 1991, 1999; Tremblay et al., 1996) has examined distinctions in the forms of childhood aggression, differentiating direct physical aggression (e.g., childhood hitting, kicking, and biting) from indirect non-physical aggression (e.g., the intentional exclusion of others from play, rumors, and gossip). Meanwhile, a range of sociological perspectives have drawn attention to the need for research to examine variability in individual level outcomes in relation to a broader range of factors measured at the family or neighbourhood levels of analysis. This report has the objective of blending psychological and sociological perspectives to examine how multi-leveled risk factors including individual, family, and neighbourhood effects influence both direct physical and indirect forms of aggression in childhood.

Building on prior research that has partitioned the variance in children's physical and indirect aggression into between-family and within-child variability (Tremblay et al., 1996), this research will investigate whether the variance in aggression can additionally be explained by between-neighbourhood variability. The inclusion of neighbourhood features in this research will broaden the consideration of structural risk factors for both indirect and direct physical aggression. Both "objective" (e.g., census characteristics) and "subjective" neighbourhood characteristics (e.g., perceived neighbourhood problems) are included to assess contextual influences on childhood aggression (see Upchurch, Aneshensel, Sucoff, & Levy-Storms, 1999). This study also examines how, or through what model form, neighbourhood characteristics affect aggression.

The current research also adds to a growing body of research investigating the impact of neighbourhoods on children's well-being. Since Canadian studies have found patterns of increasing neighbourhood disadvantage (Hajnal, 1995; Hatfield, 1997; Myles, Picot, & Pyper, 2000), the implications of neighbourhood features for children in Canada warrant further investigation (see also Boyle & Lipman, 1998; Kohen, Hertzman, & Brooks-Gunn, 1998). Some of the policy implications of the research findings on neighbourhood and family disadvantages for children are also considered.

Structural approaches in sociology share a concern with the implications of social inequalities for individuals. A range of criminological theories and research examines and explains the patterning of crime and delinquency by age, gender, race/ethnicity, family structure, and social class position (Hagan et al., 1989; Hagan & Peterson, 1995). These socio-demographic factors also operationalize structural inequalities in mental health research, yielding differential levels of stress exposure and levels of coping resources, which combine to affect symptoms of psychiatric disorders and psychological distress (Aneshensel, 1992; Avison & Gotlib, 1995; Horwitz & Scheid, 1999; Mirowsky & Ross, 1989; Pearlin, Menaghan, Lieberamn, & Mullan, 1981; Turner, Wheaton, & Lloyd, 1995). Both of these sociological fields reveal that as disadvantages increase in individuals' lives, so do the likelihood of problematic outcomes including decreased well-being and increased deviant behaviour. These areas have emphasized the need to further examine the role of neighbourhoods as sources of social inequality on childhood outcomes (Avison, 1999b; Cohen, Slomkowski, & Robins, 1999; McLeod & Nonnemaker, 1999; Pearlin, 1999; Sampson, 1997). These perspectives in sociology are then linked in this research to approaches in developmental psychology to further examine how structural inequalities affect younger children (see also McLeod & Shanahan, 1993; Menaghan, 1999; Pepler & Sedighdeilami, 1998; Tremblay et al., 1996).

2.1.1 Gendered Outcomes

Aneshensel and colleagues (1991) raised the issue of including multiple outcomes across domains in mental health research. In their research, a model examining structural effects on substance use/dependence (which is more common among males) was compared with the results of a second model examining affective or anxiety disorders (more common to females). These results showed that the effect of being female was to increase affective or anxiety disorders, but was to decrease substance abuse/dependence. They conclude from these results that "men and women appear to be similarly affected by the types of stressful events and circumstances considered here, but these effects are manifest as different types of disorder" (p. 174). We suggest that considering gendered manifestations of behaviour more broadly could expand the significance of this framework. This focus would clarify whether social structural effects across levels of analysis are common across males and females or have gender-specific effects. While research on child and youth well-being in sociology has investigated how environmental features may affect more composite outcomes (e.g.

externalizing and internalizing behaviour problems) or more specific outcomes like predatory delinquency, qualitative distinctions in aggression have received little attention.

One of the forms of research addressing the implications of structural inequalities concerns circumstances that produce gendered outcomes through differential exposure or vulnerability to social stressors (i.e., a "structural strain" perspective; see Aneshensel, 1992; Kessler & McLeod, 1984; Mirowsky & Ross, 1995; Turner & Avison, 1989; Turner et al., 1995). Research shows a consistent pattern of higher levels of psychological distress among women than men. Further analyses have examined whether this gender difference may in fact be due to two rival hypotheses outlined in the "gendered response" and "response bias" theories (Mirowsky & Ross, 1995). The gendered response theory predicts that men and women may have different emotional responses; therefore men may be as likely to be distressed as women, but may show this distress through anger rather than depressive symptoms. In contrast to this prediction, empirical research has found that the effect of being female is to increase both depressive symptomatology (e.g., sadness) and anger. By any of the six measures assessed, women experience more distress than men (Mirowsky & Ross, 1995, p. 463). A second potential explanation for the gender gap in distress involves response biases to survey items where women may be more expressive of their emotions than men. This perspective suggests that differences between male and female levels of distress are artifactual and due to response styles. However, the observed gender gap in distress when measured by either distress or anger holds net of a measure of differential expressiveness (Mirowsky & Ross, 1995).

A summary of issues related to interpreting gender differences in outcomes considers how a "...disorder may take behavioral forms as well as emotional ones" (Mirowsky & Ross, 1995, p. 465). Although the behavioural manifestations of alcoholism, drug abuse, and antisocial behaviour may be more prevalent among males than females, these outcomes are not themselves necessarily indices of psychological/emotional distress according to this view (see Mirowsky & Ross, 1995). Rather, these outcomes may be indicative of differential behavioural responses to societal strains by gender.

Within unequal social structures, behavioural responses may be considered as adaptations to environmental constraints and opportunities (Patillo-McCoy, 1999; Suttles, 1968). Gender role

socialization occurs within social structure, and as Heimer (1995) also indicates in research on violence, "...the specific form of these acts varies with position in the power-structure" (p. 143). Rather than focusing on a range of disorders within mental health research per se (see Aneshensel et al., 1991; Rosenfield, 1999), the gendering of violent and delinquent behaviour more specifically (Heimer & DeCoster, 1999), or on the co-occurrences of multiple problems (Kessler et al., 1994; Loeber, Farrington, Stouthamer-Lober, & Van Kammen, 1997), this research examines distinctions within a specific form of childhood behaviour at an early life stage: childhood aggression.

This report examines how neighbourhood and family conditions affect the potentially gendered manifestations of behaviour in the forms of both indirect and physical aggression. Including only one form of aggression that may be more sensitive to the behaviours of males or females may potentially obscure conclusions regarding contextual influences. Policy implications of neighbourhood effects research may be clarified through the inclusion of both forms of aggression. Furthermore, research may not fully capture the effects of social structural locations on children and youth by operationalizing only more mainstream sociological outcomes, such as physical aggression.

2.1.2 Childhood Aggression

Physical aggression has been defined by Loeber and Hay (1997) as "...a category of behaviour that causes or threatens physical harm to others" (p. 371). Common features of aggressive acts include the potential for harm, that they are intentional, and they must be aversive to the victim (Coie & Dodge, 1998, p. 783-784). Consistent with the definition of physical aggression, indirect aggression involves anger and actual or potential harm in the forms of a damaged reputation or relationships, and psychological harm (see Buss, 1961; Coie & Dodge, 1998, p. 791; Crick, Bigbee, & Howes, 1996; Feshbach, 1969; Lagerspetz et al., 1988; Rutter, Giller, & Hagel, 1998, p. 148). While earlier definitions of indirect aggression included overt behaviours, more recent research examines a set of covert behaviours that include subtle differences among indirect, social, and relational aggression. These behaviours commonly involve the manipulation of the social structure with the intent to control others and induce harm (see also Rys & Bear, 1997; Verlaan, 1995; Xie, Swift, Cairns, & Cairns, 2000).

Research in the United States has suggested that the tendency in the literature on aggression to find higher levels among boys than girls may be due to the focus on physical aggression (see Crick & Grotpeter, 1995). A finding of a "lack" of aggression in girls may obscure attention from potentially harmful behaviours that girls may be more likely to engage in, and be the recipients of than boys (Crick & Grotpeter, 1995, p. 710). While males are seen as more likely to value instrumentality and physical dominance, girls may be more likely to value relational issues, including establishing intimate connections with others (Crick & Grotpeter, 1995; Taylor, Gilligan, & Sullivan, 1995). Children's strategies may be chosen on the basis of the likelihood that they will inflict harm (or aggress) by disrupting valued goals (Crick et al., 1996). Therefore, girls would be more likely than boys to engage in relational harm, while boys would be more overt in their strategies. Further, child socialization practices may differentially reinforce aggressive responses by gender (see Cairns & Kroll, 1994; Rosenfield, 1999).

Gender differences in peer reported relational and indirect aggression have been observed by Crick and colleagues in the United States, and in Finland by Lagerspetz et al. (1988) and Bjorkqvist, Lagerspetz, and Kaukiainen (1992). This research has found that females in middle childhood and early adolescence have higher levels of relational or indirect aggression than males. However, males show higher levels of physical and overt aggression than females. Recent Canadian research by Tremblay and colleagues (1996) used the person most knowledgeable about the child's ratings of indirect aggression. Similar to the peer assessed results, females at each age had higher levels of indirect aggression than boys, and boys had higher levels of physical aggression than girls. Although a range of structural effects on physical aggression and other externalizing behaviours have been examined, fewer environmental linkages have been drawn to indirect aggression. Two Canadian studies using the National Longitudinal Survey of Youth data have included social structural and processual effects on both forms of aggression including familial socio-economic status and parenting effects (Pepler & Sedighdeilami, 1998; Tremblay et al., 1996). Social structure is expanded in this research to include aspects of children's social context including neighbourhood characteristics and additional family characteristics.

2.1.3 Multi-Level Risk Factors

A broad range of interdisciplinary research has raised the implications of contextual environments for individuals (Aaronsen, 1997; Anderson, 1990, 1997, 1999; Aneshensel & Sucoff, 1996a; Boyle & Lipman, 1998; Brooks-Gunn, Duncan, Klebanov, & Sealand, 1993; Brooks-Gunn, Duncan, & Aber, 1997a,b; Elliott et al., 1996; Garbarino, Dubrow, Kostelny, & Pardo, 1992; Garner & Raudenbush, 1991; Gephart, 1997; Jencks & Mayer, 1990; Kohen et al., 1998; Kowaleski-Jones, 2000; Leventhal & Brooks-Gunn, 2000; McLeod & Nonnemaker, 2000; Peeples & Loeber, 1994; Ross, 2000; Sampson, 1992, 1997; Sampson, Raudenbush, & Earls, 1997; Sucoff & Upchurch, 1998; Upchurch et al., 1999; Willms, 1986; Wilson, 1987). Although research has considered the role of context for physical aggression, the more subtle linkage to indirect aggression has emerged recently from qualitative research (Anderson, 1997).

Ethnographic research on neighbourhood disadvantage has provided some insight into gendered manifestations of the linkages between the "code of the streets" and the necessity of aggression to protect one's reputation as a requirement for daily negotiation of the environment. Among males, this is accomplished through physical aggression. Among females however, this negotiation of the environment may include more indirect means. As Anderson (1997) observes, "A major cause of conflicts among girls is 'he say, she say.' This practice begins in the early school years and continues through high school. It occurs when 'people,' particularly girls, talk about others, thus putting their 'business in the streets.' Usually one girl will say something negative about another in the group, most often behind the person's back. The remarks will then get back to the person talked about. She may retaliate or her friends may feel required to 'take up for' her. In essence, this is a form of group gossiping in which individuals are negatively assessed and evaluated. As with much gossip, the things said may or may not be true, but the point is such imputations can cast aspersions on a person's good name. The accused is required to defend herself against the slander, which can result in arguments and fights, often over little of real substance. Here again is the problem of low self-esteem, which encourages youngsters to be highly sensitive to slights and to be vulnerable to feeling dissed. To avenge the dissing, a fight is usually necessary" (p. 26).

The above quotation links gender and neighbourhood conditions. Context is implicated in this quotation with the structural conditions promoting cultural codes that reinforce "respect" on the

streets, accomplished by physical means for males, and by reputation, interpersonal relations, and potentially physical means for females. These observations suggest expanding current sociological research on children's and youth's outcomes to include more sensitive measures of aggression that may better assess how behaviour is manifest by gender. Both relational and physical aggression may be seen as "self-protective" strategies in disadvantaged contexts, or as adaptations to structural circumstances (see also Suttles, 1968). In terms of the prevention of serious physical violence, it may also be advantageous to consider indirect aggression as a precursor, possibly identifying a point of intervention.

2.1.4 Neighbourhood Effects

Research has emphasized the continued need to examine how neighbourhoods affect children and youth (Aneshensel & Sucoff, 1996a,b; Boyle & Lipman, 1998; Brooks-Gunn et al., 1997a,b; Burton & Jarrett, 2000; Cook, Shagle, & Degirmencioglu, 1997; Duncan & Aber, 1997; Furstenberg, Cook, Eccles, Elder, & Sameroff, 1999; Kupersmidt, Griesler, DeRosier, Patterson, & Davis, 1995; Leventhal & Brooks-Gunn, 2000; McLeod & Edwards, 1995; Sucoff & Upchurch, 1998). A range of theoretical models specifying neighbourhood influences on children and youth outcomes have been described in the literature. These models are listed in Figure 2.1. As the articles and literature reviews referenced above provide a comprehensive overview of the empirical findings of neighbourhood effects on children and youth, this section will provide only a brief summary. Specific studies categorized by the type of model tested in the research are also reviewed in Foster (2000).

Figure 2.1 **Theoretical Models of Neighbourhood Effects on Childhood Aggression**

Structural	Mediational	Ecological	Composite Risk
• Neighbourhood SES • Collective Socialization • Institutional Resources • Epidemic/ Contagion Relative Deprivation • Competition • Other Neighbourhood Dimensions	• Familial Mediators Home Environment • Community Mediators Norms/Collective Efficacy	• Protective • Other • Potentiator • Person-Environment Fit	• Composite Score of Risks Including Neighbourhood Conditions

The models considered in this research draw on both the structural tradition emphasizing main effects (see Sucoff & Upchurch, 1998) and indirect mediational model forms (see Kowaleski-Jones, 2000; McLeod & Nonnemaker, 2000). The structural tradition suggests that neighbourhood risk factors exert "uniform" harmful effects on youth. Structural models emphasize the comparative effects of different neighbourhood factors, or the effect of a combination of factors measured by composite indices derived from census data (e.g., neighbourhood disadvantage). Approaches vary in specifying the model as a set of general risk conditions on a range of adjustment outcomes, or whether neighbourhood risk factors have been selected as potentially influential on a particular outcome (e.g. behaviour problems). The theoretical models have evolved from a focus on neighbourhood socio-economic status to include a broader range of neighbourhood conditions (see also Duncan & Aber, 1997).

In column one of Figure 2.1, the five models identified by Jencks and Mayer (1990) are listed that have been tested in the literature to examine the effects of neighbourhood income levels on child and youth outcomes (Boyle & Lipman, 1998; Brooks-Gunn et al., 1997a,b; Kohen et al., 1998). The models specify which mechanisms in the neighbourhood environment affect children. Peers are emphasized as socializing agents in "epidemic" models, socialization by adults in the community are central to "collective socialization" models, and the influences of other adults not living in the community are included in "institutional" models. This set of models predicts that the presence of affluent neighbours will foster child development. In contrast, "relative deprivation" and "competition" models emphasize social comparisons and access to limited resources. They predict that affluent neighbours will hinder disadvantaged children. Finally, an additional "no effect" model predicts that affluent neighbours have no influence on children's outcomes (Mayer & Jencks, 1989).

Collective socialization and institutional resource models have been expanded to include the level of male joblessness in the community and ethnic diversity. Competition models have also included the concentration of families in the environment. Other key structural features of neighbourhoods include residential stability, immigrant concentration, the adult/child ratio, the population density, and neighbourhood family structure (Boyle & Lipman, 1998; Sampson, Morenoff, & Earls, 1999).

Findings have supported theories of collective socialization and neighbourhood resources to explain neighbourhood effects in early childhood, and additionally support competition theories for early school aged children. In an extensive review of the literature on neighbourhood effects on children and youth, recent research concludes: (a) across all of the outcomes, SES appeared to matter most, although the particular indicator of SES that mattered most varied by outcome. The strongest evidence was provided for the importance of high-SES neighbourhoods for achievement outcomes among both children and adolescents. Low-SES neighbourhoods and residential stability mattered most for adolescent juvenile delinquency. Low-SES neighbourhoods also seemed to be associated with young children's externalizing behaviour problems (Leventhal & Brooks-Gunn, 2000, p. 328).

The structural effects models assessed in this report address the following research questions: (1) Which features of the neighbourhood environment affect childhood physical and indirect aggression? (2) Are both objective and subjective environments influential on childhood aggression? Mediational models then expand the structural effects approach by investigating the processes through which neighbourhoods affect residents. The inclusion of processual variables operationalizes the intervening explanatory mechanisms (Cook et al., 1997; Leventhal & Brooks-Gunn, 2000, p. 321). Studies testing mediational models within the neighbourhood effects literature include four approaches: (1) aggregate level neighbourhood process mediators of neighbourhood structural effects on aggregate neighbourhood rate outcomes; (2) multilevel research with aggregate neighbourhood process mediators and individual level outcomes; (3) individual subjective perceptions of neighbourhoods on individual level outcomes; and (4) family level mediating processes with individual level outcomes. These models vary by the level of analysis of the mediators and outcomes, and the analytic techniques used to test the models. The mediating variables also vary by the life stage of those studied, and the theoretical orientation of the research. In research on children, theoretical perspectives have expanded to include a mediating role for family mechanisms (Klebanov, Brooks-Gunn, Chase-Lansdale, & Gordon, 1997, p. 121-122; Klebanov, Brooks-Gunn, & Duncan, 1994, p. 443; Furstenberg et al., 1999; Sampson, 1992, 1997). In their recent review article Leventhal and Brooks-Gunn (2000, p. 322) reformulate the main predictions of the Jencks and Mayer (1990) models to include three main potential mechanisms by which neighbourhoods affect children and youth: (1) institutional

resources; (2) relationships; (3) norms/collective efficacy. The latter two mechanisms are suggested to be particularly important for delinquency.

A number of mediational models have been considered with different processes theorized as mediating. One set of these models includes collective subjective neighbourhood processes, aggregated to community level indices, to mediate the effects of neighbourhood structural characteristics on community and individual level outcomes (Sampson et al., 1997). At the individual level, some research considers how subjective dimensions of neighbourhoods may mediate the effects of antecedent neighbourhood conditions on a range of outcomes. It has also been suggested that these mediators of neighbourhood structural effects are themselves another form of neighbourhood effects on youth outcomes (Furstenberg et al., 1999).

Other mediating processes in recent research with children have included family mechanisms that transmit neighbourhood effects (Sampson, 1997). These familial mediators can be distinguished as within-home and extra-familial processes (Furstenberg et al., 1999). However, for young children, the most common and salient mediators include the within-home mediators including parental behaviour and the home environment (Leventhal & Brooks-Gunn, 2000, p. 324). Several reasons have been suggested in the literature for the lack of research on family mediating mechanisms (Cook et al., 1997), including that the traditional focus of the neighbourhood effects literature has been on adolescents (Klebanov et al., 1997, p. 120).

The main research questions used to investigate the mediational models include: (1) Does the perceived environment explain the effects of the structural environment on aggression? (2) Is the effect of neighbourhood conditions on both forms of childhood aggression reduced by indicators of the home environment?

2.2 Method

To investigate the research questions proposed, these analyses use Cycle One (Release Three) of the National Longitudinal Survey of Children and Youth (NLSCY) gathered in Canada in 1994-95. The research design of this data source is first briefly described, followed by an overview of the analytical techniques and measurement of variables that are used in these analyses.

2.2.1 Research Design

The NLSCY is a nationally representative prospective longitudinal sample of newborns through eleven year old children in Canada. A complex sampling design was developed by Statistics Canada to identify dwellings with eligible children for inclusion in this study (HRDC/STC, 1997, p. 239). Households with children in the appropriate age range were first selected from an area frame. Once eligible households were selected, procedures were followed to randomly select one target child in the 0-11 year old age range who lived a majority of time in the household. Other children in the same economic family as the target child, up to a maximum of four children in the eligible age range per household, were also selected. The final NLSCY sample includes 13,439 household and 22,831 children, with a response rate of 86.3%. The "share file" (HRDC/STC, 1997) used for these analyses includes 21,455 of the 22,831 children (94%) of those included in the "master file". These analyses use information on the child provided by the person most knowledgeable about the child (PMK) and census variables appended to the NLSCY files to measure the children's neighbourhoods.

2.2.2 Analyses

The research objectives of this report are addressed through linking the macro- (e.g., neighbourhood and family) and micro- (e.g., child) levels of analysis. This linkage is accomplished through the use of multi-level regression modelling techniques (DiPrete & Forristal, 1994). Multilevel models also address the statistical complexities that arise when children live in the same family and/or neighbourhood, as in the NLSCY where observations were gathered through a complex sampling design (see also Boyle & Lipman, 1998; Tremblay et al., 1996). The individual observations in these circumstances are generally not completely independent as is assumed in

standard statistical tests (Hox, 1995, p. 6; see also HRDC/STC, 1997, p. 167), due to common influences from residing in the same location (Ross, 2000, p. 179). Ordinary least squares regression in such circumstances can produce too liberal estimates of standard errors yielding seemingly statistically significant results that are not significant (Bryk & Raudenbush, 1992, p. 86; Hox, 1995, p. 7; Kreft & De Leeuw, 1998, p. 9-10; Murray, 1998, p. 81).

The hierarchical linear models used child population weights normalized per individuals in the respective analyses. The population weight assigned to a child "reflects the number of children represented by a particular respondent" (HRDC/STC, 1997, p. 163). For analyses where statistical significance tests are required, sample weights are used (HRDC/STC, 1997, p. 163). The effective sample size is retained in these analyses with the use of a normalized weight, while generating unbiased population estimates for generalizing to a national population of children in Canada in this age range (HRDC/STC, 1997, p. 84). Coefficients reported in the results section follow the "normal rounding technique" described in the NLSCY User's documentation (HRDC/STC, 1997, p. 162).

These analyses use the HLM software to assess multilevel models of neighbourhood and family effects on childhood aggression (Bryk, Raudenbush, & Congdon, 1996). In this section, the three level hierarchical linear model is briefly presented. Model assumptions and hypothesis testing procedures are also briefly described.

The first model considered is a one-way ANOVA with random effects (see Bryk & Raudenbush, 1992, p. 17-18). This model is used to assess childhood aggression among siblings nested in families, who are further nested in census tracts. This unconditional three level random intercept model can be represented by three equations (Bryk & Raudenbush, 1992, p. 176-177):

(1) $Y_{ijk}=\pi_{0jk}+e_{ijk}$

(2) $\pi_{0jk}=\beta_{00k}+r_{ojk}$

(3) $\beta_{00k}=\gamma_{000}+u_{00k}$

In the first equation, the aggression score of a child $_i$ in family $_j$ and census tract $_k$ is predicted and is represented by Y_{ijk}. The level two model which is presented in equation two, in turn examines the level one intercepts as outcomes (π_{0jk}). Pi subscripted with ($_{0jk}$) indicates the mean level of aggression for family $_j$ in census tract $_k$. Finally, e_{ijk} is the random "child effect", or the deviation of the child's score from the family mean level of aggression. The assumptions of the level one model are that the level one errors (e_{ijk}) are normally distributed with a mean of zero and a constant variance at level one, σ^2.

The second equation indicates that the family level mean is a randomly varying outcome around a tract mean. β_{00k} is the tract level mean on childhood aggression, and r_{ojk} is a random "family effect", indicating the deviation of the family ($_{jk's}$) mean from the tract level mean. These effects (r_{ojk}) are assumed normally distributed with a mean of zero and a variance of $\tau\pi$, which is assumed within census tracts to have a similar variance among the families (see Bryk & Raudenbush, 1992, p. 176-177). The random effect at level two is assumed be normally distributed with a mean of zero and a variance of $\tau\pi$. The term random effects is used with this model as the group effects are considered random.

Finally, the third equation indicates the variability in childhood aggression between census tracts. The census tract level means randomly vary around a grand mean (γ_{000}). The random census tract effect is indicated by u_{00k}, which is the deviation of the census tract k's mean from the grand mean. These random effects are also assumed normally distributed with a mean of zero and a variance of $\tau\beta$ (see Bryk & Raudenbush, 1992, p. 177).

The variance in the individual level outcome is comprised of three components $\tau\pi$, $\tau\beta$, and σ^2, with the first tau parameter in this list indicating the between-family variability, the second tau parameter indicating the between-tract level variability, and the sigma squared indicating the within-group or between-individual variances respectively (Bryk & Raudenbush, 1992, p. 17). The intraclass correlation for estimating the proportion of variance in the individual level outcome that is between census tracts is derived by the following formula: $\rho=\tau\beta/(\tau\beta+\tau\pi+\sigma^2)$.

The hierarchical linear model can be expanded to include covariates at the three levels of analysis (Bryk & Raudenbush, 1992, p. 19,23). In the tables that follow, the covariates are listed and indicated at what level they were incorporated into the model. The models assessed are random intercepts models with multiple independent variables (see also Bryk & Raudenbush, 1992, p. 23). These latter coefficients are generally considered fixed.

The research design of the NLSCY is "unbalanced" in the sense that there are differing numbers of children (level 1 units) per level two units (families) and families per three level units (census tracts). Under these circumstances, maximum likelihood procedures may be used to achieve estimation of the variance/covariance components of the model (Bryk & Raudenbush, 1992, p. 44). Model fit is assessed by two procedures: the model deviance statistic and the variance components. The model fitting process uses multiparameter hypothesis tests involving comparative reductions in the deviance (indicating an improvement in fit) between models with the same sample size, testing for a statistically significant reduction compared to the change in the parameters between models using the critical values of the chi-square distribution (Appendix B of Knoke & Bohrnstedt, 1994, p. 509; see also Bryk & Raudenbush, 1992, p. 58-59). The variance explained at each level of analysis is also examined. With centered variables, these levels should decrease or stay the same (Snijders & Bosker, 1999; Thomese & Van Tilburg, 2000; Willms, personal communication). Single parameter T-tests are also used to assess the significance of the fixed effects in the models in the form of p-values indicating whether the effect (gamma) is significantly different from zero.

The proportion of variance explained in hierarchical linear models takes into account how the variance in the individual level outcome is partitioned across levels. Variables entered into the models at level two can only explain variance at that level (Bryk & Raudenbush, 1992, p. 94), or that "only the parameter variance or τ_{00}, is explainable" (p. 94). Therefore, a model may show that very little of the total variance in childhood aggression is explained by neighbourhood features, but may instead show that a sizeable proportion of the available variance has been explained through these characteristics. As Bryk and Raudenbush (1992) indicate, attention to this difference can lead to quite different conclusions regarding the substantive implications of research using higher level variables in hierarchical linear models. Later analyses in this report examine several features of hierarchical linear modelling, including model fit, the change in the

random variance components across models, the variance explained, and patterns of fixed effects across models.

2.2.3 Measurement

The items used to measure direct physical aggression for 4-11 year olds were included in the NLSCY from the Montreal Longitudinal Survey and the Ontario Child Health Study (HRDC/STC, 1995, p. 41). The person most knowledgeable about the child was asked how often would you say your child: 1) Gets into many fights?; 2) When another child accidentally hurts her/him (such as bumping into her/him), assumes that the other child meant to do it, and reacts with anger and fighting?; 3) Physically attacks people?; 4) Threatens people?; 5) Is cruel, bullies, or is mean to others?; 6) Kicks, bites, hits other children? (Cronbach's α=0.77) (HRDC/STC, 1998, p. 167, 170-204; Tremblay et al., 1996). Three items were also asked of younger children's physical aggression, permitting the inclusion of two through eleven year olds in some analyses. These are items one, six, and two from the above listing; which were summed to create a score of physical aggression for two to eleven year olds. The response scale of 1-3 was recoded to 0-2, with higher scores indicating a higher frequency of the behaviour.

The five items used to measure indirect aggression for 4-11 year olds in the NLSCY were drawn from the work of Lagerspetz et al. (1988). The person most knowledgeable about the child was asked: How often would you say your child: 1) When mad at someone, tries to get others to dislike that person?; 2) When mad at someone, becomes friends with another as revenge?; 3) When mad at someone, says bad things behind the other's back?; 4) When mad at someone, says to others: let's not be with her/him?; 5) When mad at someone, tells the other one's secrets to a third person? (Cronbach's α=0.78; HRDC/STC, 1998, p. 170-204; Tremblay et al., 1996).

The person most knowledgeable about the child rated childhood behaviour on up to four children per household. Although high within family correlations may be obtained due to a common reporter, parental reports have been found to be reliable for aggression. Parents may be the best informed about the child's behaviour across a range of contexts (see Tremblay et al., 1996, p. 129). These results also control for a measure of PMK depression that may influence their perceptions of children's behaviours (see McLeod & Shanahan, 1993).

Several approaches to neighbourhood measurement were used in this study. One set of analyses used the results obtained by Law and Willms (1998) from a cluster analysis of six features of enumeration areas from the 1991 Canadian Census: median income, average number of years of education, percentage of youth that were employed, percentage of adults that were employed, percent non-immigrant population, and percent two-parent families. These researchers found eight types of neighbourhoods characterized enumeration areas in Canada. These types reflect a combination of the six characteristics but show ordinality from Type One to Eight in terms of mean socio-economic status (Law & Willms, 1998). The combinations of salient characteristics that define each type are listed in later tables. The neighbourhood types were operationalized as dummy variables, with Type Six, or Middle Class environments serving as the reference category. These characteristics were entered at the family level of analysis. An average of three families in the national analyses were located per census tract.

The second set of analyses with highly clustered families in this report used characteristics of the ninety six census tract units with more highly clustered families. These tract characteristics include the percentage of low income families and the size of the population in the census tract.

Subjective perceptions of physical and social neighbourhood problems were also used in these analyses. The national results use a scale constructed by Statistics Canada from five items rated by the PMK including: "How much of a problem is the following in the neighbourhood": 1) garbage, litter, or broken glass in the street or road, on the sidewalks, or in yards; 2) selling or using drugs; 3) alcoholics and excessive drinking in public?; 4) groups of young people who cause trouble; 5) burglary of home or apartments? A high score on this scale indicates higher levels of problems with an observed range of 0-10 (α=0.70) (Barnes McGuire, 1997; HRDC/STC, 1998, p. 374-375). A subscale with items two, three, and four measuring social disorder was used to measure the subjective neighbourhood operationalizing perceived social disorder (see Skogan, 1990) in the clustered subsample analyses.

Finally, in addition to children's gender (female=1, and male=0) and age, both family structural and processual features are included in these analyses to measure aspects of the family context (see Rutter et al., 1998; Sampson & Laub, 1995). Measures of the home environment also include parenting practices (see Landy & Tam, 1996). Three parenting measures were used in these

analyses as a second order confirmatory factor analyses indicated that hostile and punitive parenting were highly interrelated. A measure of the PMK's rating of the child's exposure to violence in the home was also included. The PMK's symptoms of depression were assessed through a shortened version of the Centre for Epidemiological Studies Scale (CES-D) (α=0.82) (Radloff, 1977). Control variables include family socio-economic status (see HRDC/ STC, 1997, Appendix 3, p. 114-116; Tremblay et al., 1996), family structure (e.g. single parent, two parents-blended family, and two biological parents) (see Avison, 1999a), the age of the biological mother at her first birth (see Nagin, Pogarsky, & Farrington, 1997), the number of siblings in the household, whether the dwelling was owned by a member of the household, and residential crowding (see Rutter et al., 1998; Sampson & Laub, 1995). These controls facilitate comparisons of children in similar families living in different neighbourhoods (Jencks & Mayer, 1990, p. 119). Descriptive statistics on the childhood aggression measures and risk factors used in these analyses are presented in Appendix Tables A.1 and A.2. The HLM analyses use the zero point of a dummy variable or a standardized variable; otherwise grand mean centering was used.

2.3 Results

This section addresses the research questions outlined earlier by incorporating alternative operationalizations of neighbourhood and family effects across models. The results are presented by the type of aggression assessed. The two and three level hierarchical linear models are first tested using the national sample. The enumeration area types are used as a form of neighbourhood measurement not yet incorporated into the study of aggression. These results are then are compared to analyses with the highly clustered set of families in ninety-six census tract units. Census tract level neighbourhood measures and PMK perceptions of the neighbourhood environment as deviated from the census tract means are incorporated in the highly clustered subsample analyses.

The bivariate correlations at the child level of analyses among the risk factors and indirect and physical aggression are presented in Appendix Tables B.1 and B.2. The correlations are generally in the hypothesized directions for the set of family and individual risk factors. For example, being female is positively associated with indirect aggression ($r=0.07$, $p<0.001$) but is negatively associated with physical aggression ($r=-0.12$, $p<0.001$). There is a small association among neighbourhood types and features with each form of aggression. Using the enumeration area types indices, the results indicate a consistent small to modest association between living in very high socio-economic status environments compared to all other types of neighbourhoods and decreases in both forms of aggression ($r=-0.05$, $p<0.001$). However, for indirect aggression, Type 5 or lower middle class environments were positively associated with childhood aggression ($r=0.04$, $p<0.001$).

The PMK's level of perceived neighbourhood problems shows a stronger correlation with aggression than did the objective neighbourhood characteristics. An increased level of perceived problems was associated with higher levels of indirect aggression ($r=0.09$, $p<0.001$) and physical aggression ($r=0.11$, $p<0.001$). The parenting variables and exposure to violence in the home were generally the most strongly associated with childhood aggression; however, the results are suggestive of a potential contribution of neighbourhood influences to models including more established risk factors.

2.3.1 Three-Level Models: Structural and Mediational National Models of Children Nested in Families in Census Tracts

The two level hierarchical linear models with children nested in families were first assessed (results not shown). These analyses are similar to the two level models by Tremblay et al. (1996) but include additional structural risk factors, in particular the neighbourhood variables. The three level models were then assessed. The model building procedure in the first set of tables with the national sample adds variables in steps one through six listed in the left hand column of the tables with a deviance statistic reported in the far right column per stage. The columns "objective" and "subjective" refer to the final models following distinctions made in the work of Upchurch et al. (1999), where the subjective model adds the PMK's perceptions of the neighbourhood to the model. The fit statistics are presented separately in accompanying tables. The set of models with the ninety-six census tracts was built from an unconditional model, through the addition of controls, with the neighbourhood effects added last.

The results of three level random intercept ANOVA models partition the variance in indirect and physical aggression into three components as shown in Table 2.1. Fifty percent of the variability in indirect aggression is between-individuals. However, 47% of the variability in indirect aggression is between-families. Finally, there is a statistically significant variance component indicating that three percent of the variance in indirect aggression is between-census tracts. As this intraclass correlation is significant at p=0.048 with a large sample size, these analyses are considered exploratory and require further replication. However, the patterns indicate a component of the variability in indirect aggression is due to between-neighbourhood variance.

Table 2.1 **Model Fit and Variance Decomposition**

Random Intercepts ANOVA Models	Three-Level Model	Deviance	Parameters	Variance Levels		
				One	Two	Three
Indirect Aggression (4-11)	10,971 Children in 7452 Families/ in 2294 Census Tracts	39,586.95	4	1.31	1.23 p=0.000	0.08 p=0.048
Physical Aggression (4-11)	11,216 Children/ in 7585 Families/ in 2315 Census Tracts	43,062.50	4	1.71	1.38 p=0.000	0.17 p=0.000
Physical Aggression (2-11)	14,287 Children/ in 9117 Families/ in 2493 Census Tracts	42,996.92	4	0.77	0.57 p=0.000	0.08 p=0.000

Note: These sample sizes for the national analyses fall within the range of 4,500 to 17,500 children recommended by Statistics Canada to yield "marginal" estimates for analyses with 4-11 year olds (HRDC/STC, 1997: 168).

The results for physical aggression of 4 to 11 year olds indicate that 52% of the variability in physical aggression is between-individuals, and 42% is between-families (p=0.000). Five percent of the variability in physical aggression is due to between-neighbourhood differences (p=0.000). Similarly, approximately six percent of the variance in 2-11 year old physical aggression is explained by between-tract variability (p=0.000). Forty percent of the variability in 2-11 year old physical aggression is due to family level differences (p=0.000), and 54% is between-individual variance. The between-neighbourhood intraclass correlations are within the range of those found for other behavioural outcomes of children and youth, where neighbourhoods account for up to 10% of the variance (see Leventhal & Brooks-Gunn, 2000).

Covariates are introduced into subsequent models presented across the columns in the tables to examine whether the neighbourhood effects, if any, are mediated by home environment factors (see Ross, 2000). The results are presented in Tables 2.2 and 2.3. Tables 2.4 and 2.5 present the model variance components and the deviance statistics for Tables 2.2 and 2.3, respectively.

The results of the "objective" model with the enumeration area types variables of neighbourhood effects are presented in the first column of Table 2.2. These results show a trend for Type Three environments consisting of a higher percentage of single parents and immigrant population, along with low income levels and low adult employment levels, to be associated with elevated levels of indirect aggression (b=0.27, p<0.01), net of children's age, gender, and the gender by age interaction effect. The direction of this effect is consistent with the bivariate correlations between Type Three neighbourhoods and indirect aggression indicated in Appendix Tables B.1 and B.2 While the multivariate hypothesis test between the deviance for the models in columns one and two indicates a trend toward statistical significance in the improvement in model fit (for a change of 20.8 and 7 df), this result is viewed with caution as the full set of controls are not yet included in the model. The effects of the objective environment becomes non-significant when the subjective neighbourhood environment is included in Column Two of Table 2.2 (b=0.11, p<0.001). This addition to the model provides a highly significant drop in the model deviance (82.57, p<0.001 for 1 df).

Table 2.2 **Three Level Multilevel Models for Indirect Aggression of 4-11 Year Old Children Nested in Families**
(N=10,971 Children in 7,452 Families in 2,294 Census Tracts)

	Objective *b*	Subjective *b*	Mediating *b*	Final *b*
Random Intercept Model				
Intercept	1.06***	1.07***	1.02***	1.06***
Individual Level Control Variables				
Female[a]	0.23***	0.23***	0.32***	0.31***
Child's Age	0.08***	0.08***	0.07***	0.08***
Individual Level Interaction Effect				
Female*Child's Age	0.03***	0.03***	0.03***	0.03***
Enumeration Area Types (Census)[b]:				
Low Adult Employment, Low Income, Low Education	-0.02	-0.04	0.01	-0.03
Low Youth Employment, Low Education	0.06	0.04	0.10	0.07
High % Single Parents and Immigrants, Low Income, Low Employment	0.27**	0.12	0.11	-0.00
High % Single Parents and Immigrants	0.11	0.03	0.02	-0.08
Lower Middle Class	0.10†	0.09	0.10†	0.08
Upper Middle Class	-0.03	-0.02	0.01	0.03
Very High Socio-economic Status	-0.21†	-0.19†	-0.08	-0.01
PMK Perceived Problems in the Neighbourhood		0.11***	0.08***	0.06***
Family Mediating Processes				
Hostile/ Punitive Parenting			0.09***	0.08***
Positive Interaction			-0.02**	-0.02*
Consistent Parenting			-0.03***	-0.02***
Exposure to Violence in Home			0.24***	0.20***
Other Family Level Controls				
Household Socio-economic Status				-0.04
Recent Immigrant (last 4 years)[c]				0.18
Immigrant (last 5-9 years)				0.21†
Blended family--Two Parents[d]				0.26**
Single Parent Family				0.20**
Year Lived at Current Address				-0.00
Home Ownership				-0.09†
Residential Crowding				-0.15**
Number of Siblings				0.02
Biological Mother-Years of Age at First Birth				-0.01*
PMK Level of Depression				0.02***

†=0.10 (two-tailed tests of statistical significance), *=p<0.05, **=p<0.01, ***=p<0.001, a=Males, b=Type six or middle class neighbourhoods, c =Non-immigrants or immigration to Canada over 10 years ago, d=Two biological parents family structure.

Table 2.3 **Three Level Multilevel Models for Physical Aggression of 2-11 Year Old Children Nested in Families**
(N=14,287 Children in 9,117 Families in 2,493 Census Tracts) (ML-F)

	Objective *b*	Subjective *b*	Mediating *b*	Final *b*
Random Intercept Model				
Intercept	1.50***	1.51***	1.39***	1.18***
Individual Level Control Variables				
Female[a]	-0.29***	-0.29***	-0.19***	-0.20***
Child's Age	-0.05***	-0.05***	-0.04***	-0.03***
Enumeration Area Types (Census)[b]:				
Low Adult Employment, Low Income, Low Education	-0.05	-0.07	-0.03	-0.02
Low Youth Employment, Low Education	-0.16**	-0.18**	-0.13*	-0.12
High % Single Parents and Immigrants, Low Income, Low Employment	0.05	-0.07	-0.07	-0.10†
High % Single Parents and Immigrants	0.08	0.01	0.02	0.01
Lower Middle Class	-0.00	-0.01	-0.01	-0.01
Upper Middle Class	-0.06	-0.05	-0.02	-0.00
Very High Socio-economic Status	-0.22**	-0.21**	-0.13†	-0.09
PMK Perceived Problems in the Neighbourhood		0.09***	0.06***	0.05***
Family Mediating Processes				
Hostile/ Punitive Parenting			0.09***	0.09***
Positive Interaction			0.01**	0.01
Consistent Parenting			-0.01***	-0.01***
Exposure to Violence in Home			0.22***	0.17***
Other Family Level Controls				
Household Socio-economic Status				-0.01
Recent Immigrant (last 4 years)[c]				-0.13
Immigrant (last 5-9 years)				-0.12
Blended family--Two Parents[d]				0.07
Single Parent Family				0.17*
Year Lived at Current Address				-0.01*
Home Ownership				-0.05
Residential Crowding				-0.07*
Number of Siblings				0.12***
Biological Mother-Years of Age at First Birth				-0.01***
PMK Level of Depression				0.01***

†=0.10 (two-tailed tests of statistical significance), *=p<0.05, **=p<0.01, ***=p<0.001, a=males; b=Type Six or Middle Class neighbourhoods; c =non-immigrants or immigration to Canada over 10 years ago; d=two biological parents family structure.

Table 2.4 **Fit Statistics and Variance Components for Three Level Multilevel Models for Indirect Aggression of 4-11 Year Old Children Nested in Families**
(N=10,971 Children in 7,452 Families in 2,294 Census Tracts)

	Deviance	Parameters	Variance Levels		
			One	Two	Three
Random Intercept Model Intercept	39,586.95	4	1.31	1.23 p=0.000	0.08 p=0.048
Individual Level Control Variables	39,317.57	6	1.27	1.21 p=0.000	0.08 p=0.045
Individual Level Interaction Effect	39,310.55	7	1.27	1.21 p=0.000	0.08 p=0.049
Enumeration Area Types (Census)	39,289.75	14	1.27	1.21 p=0.000	0.08 p=0.074
PMK Perceived Problems in the Neighbourhood	39,207.18	15	1.27	1.20 p=0.000	0.07 p=0.172
Family Mediating Processes	38,260.76	19	1.18	1.07 p=0.000	0.05 p=0.261
Other Family Level Controls	38,142.72	30	1.18	1.03 p=0.000	0.04 p=0.483

Table 2.5 **Fit Statistics and Variance Components for Three Level Multilevel Models for Physical Aggression of 2-11 Year Old Children Nested in Families**
(N=14,287 Children in 9,117 Families in 2,493 Census Tracts) (ML-F)

	Deviance	Parameters	Variance Levels		
			One	Two	Three
Random Intercept Model Intercept	42,996.92	4	0.77	0.57 p=0.000	0.08 p=0.000
Individual Level Control Variables	42,566.93	6	0.75	0.56 p=0.000	0.08 p=0.000
Enumeration Area Types (Census)	42,542.33	13	0.74	0.56 p=0.000	0.07 p=0.000
PMK Perceived Problems in the Neighbourhood	42,413.49	14	0.74	0.55 p=0.000	0.07 p=0.000
Family Mediating Processes	40,159.82	18	0.64	0.46 p=0.000	0.05 p=0.000
Other Family Level Controls	40,000.81	29	0.64	0.44 p=0.000	0.05 p=0.000

The results of a mediational model testing whether the subjective neighbourhood effect on indirect aggression would hold net of parenting variables in the three level model are presented in Column Three of Table 2.2. The results indicate that the PMK perceptions of neighbourhood problems coefficient is reduced by 27%, but it remains statistically significant ($b=0.08$, $p<0.001$). In comparing Columns Two and Three, there is a notable suppression effect for gender. In controlling these processual home environmental variables, the effect of being female is increased

(0.32, $p<0.001$). Being female is negatively associated with hostile and punitive parenting, and is less associated with the other aspects of the home environment, including exposure to violence. This pattern suggests that because male and female children are differentially exposed to hostile and punitive parenting, the gender gap in indirect aggression is muted. Taking levels of home environment factors into account, the gender gap in aggression actually increases. Furthermore, as the effect of being female depends upon age, it should be interpreted along with the interaction effect component, indicating that the effect of being female, particularly at older ages, is in part suppressed by exposure to hostile and punitive parenting.

The final model presented in the fourth column of Table 2.2 indicates that the perceptual effect of neighbourhoods on indirect aggression holds net of family controls ($b=0.06$, $p<0.001$). Furthermore, the family structure dummy variables indicate a salient role of family structure in addition to family process on children's indirect aggression. A further model investigated whether the effect of single parent households and blended family households on indirect aggression was equal. The hypothesis of equality of these effects was rejected (χ^2 change of 17.11 for 2 df). As these results are in the same metric, it may be useful for future research to consider how family structure impacts indirect aggression, indicating a slightly greater impact of blended family status than single parent family status compared to two biological parent families. These effects require further investigation, but may be signalling that something about the family environment in blended families is putting children more at risk for indirect aggression.

The variance components for the models presented in Table 2.2 are detailed in Table 2.4. These results generally show a decrease in the model variance components as the successive models were fit. Although the deviance test indicates a contribution of the subjective environment to the explanation of children's levels of indirect aggression, the subjective environment and the objective environment together explain only approximately 13% of the available between-neighbourhood variability in aggression. However, these results may best be interpreted with the overall results from the final model that indicate an additive accumulation of risk factors including the individual, family, and additionally the neighbourhood levels of analysis combine to increased levels of indirect aggression.

Table 2.3 presents the three level model results for physical aggression among two to eleven year olds. The results of the "objective" model are presented in Column One. The enumeration area

types are used to represent the neighbourhood level of analysis, which is assumed equivalent to the family level of analysis in these models. The results in Table 2.3 indicate a protective effect of Type Two environments (those with low youth employment and low education) compared to Type Six or middle class environments ($b=-0.16$, $p<0.01$). Furthermore, the effect of very high socio-economic environments is protective against physical aggression ($b=-0.22$, $p<0.01$). While these levels of significance should be viewed with caution in a sample as large as the NLSCY, some corroborating evidence was found in examining the same model among 4-11 year old children with the broader measure of physical aggression (results not shown). The results with 4-11 year olds indicated that very high socio-economic environments exerted a protective effect ($b=-0.40$, $p<0.001$), and that Type Two environments were also protective ($b=-0.25$, $p<0.05$). In those results, there was additionally a protective effect of upper middle class environments compared to middle class environments (-0.13, $p<0.05$). As indicated in Table 2.5, the objective characteristics decrease the deviance of the model with only children's gender and age added (by a change of 24.67 and 7 df), which is at the critical value on the chi-square distribution for a statistically significant reduction at $p<0.001$. Again, these results should be viewed with caution as not all of the theoretical control variables are yet in the model.

These results may be suggesting that the opportunity structure in middle class environments free children from some of the more protective influences of certain combinations of neighbourhood factors. Willms (1999) draws on work by Raffe and Willms (1989) on Scottish pupils' academic attainment to link the "local opportunity structure" in communities and educational attainment (p. 88). Their findings indicated that "in communities where there were few opportunities for employment, pupils achieved better grades on national examinations and were more likely to stay in school beyond the compulsory period" (Willms, 1999, p. 88).

Other models examined in this research use the "neighbours score" and "neighbourhood safety score" constructed by Statistics Canada. Those variables were found to have no discernible impact when added at the family level of analyses net of the other variables in the equation. Finally, given the theoretical rationale behind the categories of "social" and "physical" disorder in the neighbourhood effects research, an alternative set of models with a latent class version of the perceived problems subjective environment was used. These results were generally consistent with the continuous version of this scale.

2.3.2 Three-Level Structural and Mediational Models with Census Tract Level Characteristics at the Census Tract Geographical Level of Analysis (96 Units)

A subsample of ninety-six census tract units from the NLSCY are used in this section to operationalize the neighbourhood context. These units generally contain between ten and twenty families, when missing data on the full set of variables used in these analyses is taken into account. The more highly clustered sample facilitates the aggregation of the PMK subjective neighbourhood assessments across families to the tract level. Further, the more highly clustered sample permits better reliability of the tract mean level of aggression.

As the coding is central to the interpretation of the results that follow, the scales used in these analyses are briefly reviewed. These scales were constructed specifically for these ninety-six units and are slightly different than the Statistics Canada scales used in the national analyses. Three items were combined together as the new scale of perceived tract problems, where a score of zero indicates high problems, and a score of six indicates low problems. The collective efficacy score combines five items with a score of zero indicating high collective efficacy, and a score of 15 indicating low collective efficacy.

The zero order correlations from the ninety six census tract units using the tract level file from the 2-11 physical aggression analyses are presented in Appendix Tables B.1 and B.2. As the percentage of low income families in the neighbourhood increases, neighbourhood problems increase, as indicated (given the coding) by the negative relationship (-0.24, $p<0.05$). Lower levels of collective efficacy are indicated by higher levels on that scale, therefore, a positive correlation is observed between higher scores and a higher percentage of low income families in the neighbourhood (0.34, $p<0.001$). This indicates that children living in disadvantaged families face higher levels of problems in their neighbourhoods and have fewer resources available in those environments to offset the additional stressors. Finally, higher levels of neighbourhood problems at the tract level, as indicated by lower scores on this scale, are associated with higher scores on the collective efficacy score, which is indicative of lower levels of collective efficacy (-0.27, $p<0.01$). Therefore, tract level collective efficacy and neighbourhood problems are inversely related.

Given the salience of the subjective environment in the national analyses for both types of aggression, it was considered central to these analyses to include the person most knowledgeable (PMK) about the child's scores in the models in addition to the tract level scores. However, in order to derive unique measures, it was necessary to deviate the PMK measure from the tract level variable. A PMK score was calculated at the family level in parallel to the tract level score (α=0.70), as the three item scale was constructed for these tract level units. The PMK score was then deviated from the tract level score. This deviation in neighbourhood problems was used as an indicator of the differences between the tract level problems and the PMK's perception of problems in the neighbourhood. Similarly, a deviation score from the tract level mean on collective efficacy was calculated by subtracting the parallel measure at the PMK level.

Given the complex coding, examples of the deviation score are considered to guide interpretation. A census tract level of high problems with a score of 0 minus a PMK score of 2 would equal -2. A census tract level measure of low problems, indicated by a score of six, subtracting a PMK score of 2 (indicating higher perceived problems by the PMK) would yield a score of 4. Therefore as deviations increase there is a larger gap between the tract score and the PMK perception. Positive deviations indicate the PMK perceived problems are greater than the CT means, while negative deviations indicate a lower level of PMK perceived problems than the CT means. As this scale uses fewer items than the original PMK perceived problems score, it allows slightly more cases into the analyses with listwise deletion across all variables. The sample sizes are reported per table.

Table 2.6 was reported from a set of analyses for indirect aggression that showed a distribution as follows: 11.5% of families had less than ten families per tract but greater than three families, 6.2% had more than twenty families per tract, and 82% had 10-20 families per tract. In turn, 59% of those families had one child per home, 33% had two children per home, 7% had three children per home, and less than 1% had four children per home. These analyses show a small to modest intraclass correlation (ICC=2.7%), indicating statistically significant variability in indirect aggression across census tracts. These results are similar to those found nationally with the census tract units. The controls were added to the model in stages from the child level controls to the neighbourhood effects. The perceptual environment deviation scores were added last to the model to assess their contribution net of all other factors on childhood aggression. While the tract level

objective census tract variables did not provide a significant reduction in the deviance between models, the addition of the perceptual deviations scores decreased the deviance by 16.98, ($p<0.001$). These results indicate a modest (2%) additional decrement to the level of between-family variability explained, however, the results show that the deviation in the PMK's score has an influence on children's indirect aggression. This effect was estimated at $b=0.19$ ($p<0.001$). As the positive deviation increases (that is, the PMK score is lower than the CT score, indicating greater levels of PMK perceived problems than CT problems), children's indirect aggression increases. In an additional set of analyses, the PMK's perceptions of social support were included as a potential source of spuriousness for the deviations in perceptions of neighbourhood problems results. Social support did not have a statistically significant effect on children's indirect aggression with all the other variables in the model, however, the deviations in perceived problems variable remained significant.

The results presented in Table 2.7 indicate that for 2-11 year old physical aggression, there is statistically significant between-neighbourhood variability (ICC=4%, $p<0.001$). There are significant declines in the model deviance at steps two and three through the addition of child and family level controls. The consistent single parent family structure effect found nationally on physical aggression is no longer significant in this smaller group. However, an increased number of siblings remains a risk factor for physical aggression ($b=0.15$, $p<0.001$). Similar patterns for the other fixed effects in the model are observed in these results compared to the national analyses. When the census tract level measures are added to the model, they do not provide an improvement in the model deviance. However, a fixed effect for the subjective tract level environment was found to be statistically significant (at $b=-0.23$, $p<0.05$). This result indicates that as neighbourhood problems increase (indicated by a lower score), childhood physical aggression increases. Finally, adding the PMK perceptual deviations provides a statistically significant drop in the deviance (14.57 for 3 df). As found for indirect aggression, the deviation of the PMK's score from the CT score is positive at (0.11, $p<0.01$). Again, given the coding, this result indicates that as the deviation positively increases (that is the PMK's score is lower than the CT score, indicating greater levels of PMK perceived problems than CT problems), children's indirect aggression increases. The addition of the PMK deviation scores contributes about two percent to the variance explained in physical aggression, controlling for all other factors.

However, the consistency of the subjective PMK neighbourhood results is suggestive of robust effects on aggression.

Table 2.6 **Three Level Structural Models with Tract Level Effects and PMK Deviations Effects on 4-11 Year Old Indirect Aggression**
(N=2,011 Children in 1,350 Families in 96 Census Tract Units)

	b	Deviance (ML-F)	Estimated Parameters	Variance Levels		
				One	Two	Three
Random Intercept Model		7,299.41	4	1.44	1.04 p=0.00	0.07 p=0.027
Intercept	1.14***					
Child Level Control Variables		7,039.40	11	1.26	0.94	0.05
Female[a]	0.21**					
Child's Age	0.13***					
Hostile/ Punitive Parenting	0.09***					
Positive Interaction	-0.02†					
Consistent Parenting	-0.00					
Exposure to Violence in Home	0.26***					
Female*Child's Age	-0.03					
Family Level Control Variables		7,013.50	22	1.25	0.90	0.05
Household SES	-0.07					
Recent Immigrant[b] (last four years)	0.63					
Immigrant (last 5-9 years)	0.18					
Two Parents-Blended Family[c]	0.50*					
Single Parent Family	-0.14					
Years Lived at Current Address	-0.00					
Home Ownership	-0.12					
Residential Crowding	-0.34*					
Number of Siblings	-0.02					
Biological Mother's Years of Age at First Birth	-0.01					
PMK Level of Depression	0.00					
Tract Level Variables		7,007.77	26	1.25	0.90	0.04 p=0.086
Tract Incidence Low Income Families	1.39†					
Census Tract Population	0.00					
Tract Collective Efficacy	-0.06					
Tract Neighbourhood Problems	0.03					
Deviations of PMK		6,990.79	28	1.25	0.88	0.04 p=0.080
Neighbourhood Variables from the CT Means:						
Perceptions of Problems in the Neighbourhood	0.19***					
Collective Efficacy	0.03					

†=0.10 (two-tailed tests of statistical significance),*=p<0.05, =0.10 (two-tailed tests of statistical significance), **=p<0.01, ***=p<0.001, a=males; b=Type Six or Middle Class neighbourhoods; c =non-immigrants or immigration to Canada over 10 years ago; d=two biological parents family structure.

Table 2.7 **Three Level Structural Models with Tract Level Effects and PMK Deviations Effects on 2-11 Year Old Physical Aggression**
(N=2,579 Children in 1,625 Families in 96 CT Units)

	b	Deviance (ML-F)	Estimated Parameters	Variance Levels		
				One	Two	Three
Random Intercept Model		7,912.21	4	0.82	0.61	0.05 p=0.000
Intercept	1.21***					
Child Level Control Variables		7,452.31	10	0.71	0.47	0.03
Female[a]	-0.11**					
Child's Age	-0.03**					
Hostile/ Punitive Parenting	0.09***					
Positive Interaction	0.01					
Consistent Parenting	-0.01					
Exposure to Violence in Home	0.27***					
Family Level Control Variables		7,401.14	21	0.71	0.44	0.03 p=0.008
Household Socio-economic Status	-0.01					
Recent Immigrant (last four years)[b]	-0.18					
Immigrant (last 5-9 years)	0.07					
Two Parents-Blended Family[c]	-0.09					
Single Parent Family	-0.08					
Years Lived at Current Address	-0.01†					
Home Ownership	-0.17*					
Residential Crowding	-0.22*					
Number of Siblings	0.15***					
Biological Mother's Years of Age at First Birth	-0.02***					
PMK Level of Depression	0.01*					
Tract Level Variables		7,396.10	25	0.70	0.44	0.02
Tract Incidence Low Income Families	-0.45					
Census Tract Population	0.00					
Tract Collective Efficacy	0.01					
Tract Neighbourhood Problems	-0.23*					
Deviations of PMK		7,381.53	27	0.70	0.43	0.02 p=0.010
Neighbourhood Variables from the CT Means:						
Perceptions of Problems in the Neighbourhood	0.11***					
Collective Efficacy	0.02†					

†=0.10 (two-tailed tests of statistical significance), *=p<0.05, **=p<0.01, ***=p<0.001, a=males, b=Type Six or Middle Class neighbourhoods, c =non-immigrants or immigration to Canada over 10 years ago, d=two biological parents family structure.

2.4 Discussion and Policy Implications

The enumeration area types analyses sought to differentiate which aspects of the objective environment affected either type of aggression, if at all. The combination of factors in Type Three environments (high percentage of single parents and immigrants, low income, low employment) act together as risk factors for indirect aggression compared to middle class environments. The census tract level variables indicate that the proportion of low income families in the census tract also act as a borderline risk factor for indirect aggression. However, with controls for family and child level variables, the objective environment effects tend to be explained. It is the subjective environment which is consistently found to exert a significant risk effect across all models for indirect aggression.

The analyses using the enumeration area types found that Type Two environments (low youth employment, low education) and Type 8 (very high socio-economic status) environments have a protective effect on physical aggression. These results are most consistent with "collective socialization" models of neighbourhood effects. Past research has shown an association between increased male joblessness and decreased child behavioural functioning, especially for school aged children (Leventhal, Brooks-Gunn, & Kammerman, 1997, p. 188). However, in considering joblessness among youth, actual levels of employment have been differentiated from youth perceptions of future employment possibilities (Leventhal & Brooks-Gunn, 2000). It is possible that while youth employment can be a resource, especially for older youth, it may also act to decrease youth involvement in the neighbourhood including the supervision of young children. This finding may extend both collective socialization and contagion models of neighbourhood effects.

The results for physical aggression indicate the protective role of high socio-economic status environments, while the indirect aggression results indicate a potential risk effect of more disadvantaged areas. The literature has found inconsistent effects of neighbourhood characteristics on behaviour problems, however, studies have shown that lower SES environments lead to higher levels of externalizing behaviour problems (see Leventhal et al., 1997; Leventhal & Brooks-Gunn, 2000). Higher SES environments have been associated in the literature with better educational outcomes. However, higher SES environments were found in

this research to also be protective against physical aggression. Future research may better identify what processes are involved in this association through indirect effects (Leventhal et al., 1997).

The findings of this report also concur with past research that has found the prominence of family factors over neighbourhood factors in explaining children's behaviour problems (see Brooks-Gunn et al., 1997a; Klebanov et al., 1997). Neighbourhood influences on younger children (aged three to six) have been found to be mediated by parental characteristics and behaviour (see Klebanov et al., 1997). These results are similar to the additive models of risk examined with the NLSCY. The current research also sought to identify some of the mediating factors, including parenting practices in explaining the role of the perceived neighbourhood environment and the home environment in the gender gap in the types of childhood aggression. Both suppression and explanatory effects were found with the addition of the parenting variables in interpreting the association between gender and aggression.

The mediational models concerning the effect of the subjective environment were not supported. Instead, the subjective and objective environments were found to act in combination in additive models as risk factors for children's aggression. The census tract level results also did not indicate a mediating effect of the subjective environment, but rather an additive contribution. Future research with longitudinal data and the expanded measurement of the subjective environment through child and interviewer reports may supplement this research. However, these findings indicate that the subjective environment may be a key aspect of children's proximal environments (see also McLeod & Nonnemaker, 2000). The investigation of ecological models also suggests an area of further research (see Furstenberg et al., 1999).

Some additional features of structural features of the family in the community and family structure not yet in the literature on aggression including the more detailed family structure effects of the number of siblings, home ownership, and the number of years lived in the neighbourhood. The latter two variables may be assessing integration into the neighbourhood environment or other support systems. Integration may act as a resource for parents in neighbourhoods to decrease children's aggressive behaviours.

The finding that some features of the neighbourhood environment contribute to childhood aggression raises the issue of inequality among environmental contexts. While macro-level

processes of societal investment and disinvestment may affect environmental conditions, these concepts are also linked to personal life course "recapitalization" (Hagan, 1994). Recapitalization includes "an effort to reorganize what resources are available, even if illicit, to reach attainable goals" (Hagan, 1994, p. 70). The concept of recapitalization for both communities and individual trajectories may further inform preventive interventions. In adapting to adverse circumstances, children's aggressive behaviour may become functional and sustained. Similarly, disadvantaged communities may become recapitalized in the form of criminal rather than conventional activities. However, recognizing and attempting to prevent both indirect and direct aggression may serve to mitigate later life course consequences for both boys and girls (see also Sampson & Laub, 1995).

Finally, norm-focused scholarship from socio-legal perspectives may also inform research on aggression (Etzioni, 2000; Hagan & Foster, 2000; Meares & Kahan, 1998). As punitive policies have been found to reinforce problem behaviours (see Hagan & McCarthy, 1997), educational efforts to both peers and the broader public may be useful in altering behaviours. This may include efforts to broaden the societal recognition of aggression as including indirect as well as direct physical behaviours. Peer mediation and community centered initiatives may also be more broadly useful in reducing problem behaviours (Owens, Shute, & Slee, 2000; Sampson et al., 1997). Preventive efforts may be more urgent in disadvantaged contexts where youth have fewer structural resources available to cope with these experiences (see Taylor et al., 1995).

As in most of the research on neighbourhood effects, consideration must be given in interpreting the results reported here to separating empirical effects from selection processes or endogenous effects (Duncan, Connell, & Klebanov, 1997; Katz, Kling, & Liebman 1999; Leventhal & Brooks-Gunn, 2000; McLeod & Edwards, 1995; Tienda, 1991). Selection effects may arise as families exert choice within constraints in determining where they live (Duncan et al., 1997). If the unobserved factors that affect residential location also affect developmental outcomes of children, then the failure to include those unobserved factors in the models may lead to biased estimates, either in the form of the overestimation or underestimation of neighbourhood effects on children's outcomes (Duncan et al., 1997, p. 230-231; Leventhal & Brooks-Gunn, 2000, p. 314). The sibling data collected over time in the NLSCY may provide further research options and definitive conclusions regarding the influences of neighbourhood effects (see Aaronsen, 1997).

Appendix

Table A1 **Descriptive Statistics at the Child Level of Analysis for Physical Aggression** (2-11 Years Old)

	Mean	Standard Deviation	Minimum	Maximum
Physical Aggression (2-11)	1.02	1.22	0	6
Female	0.49	0.50	0	1
Child's Age	6.49	2.87	2	11
Hostile/Punitive Parenting	13.90	5.25	0	37
Positive Interaction	13.47	3.28	1	20
Consistent Parenting	14.71	3.48	0	20
Exposure to Violence in the Home	1.11	0.38	1	4
Household Socio-economic Status	-0.04	0.78	-3.16	2.82
Recent Immigrant (past 4 years)	0.02	0.15	0	1
Immigrant (5-9 years)	0.04	0.19	0	1
Biended Family	0.05	0.21	0	1
Single Parent Family	0.15	0.35	0	1
Two Biological Parents Family	0.80	0.40	0	1
Years Lived at Current Address	5.83	5.09	0	48
Home Ownership	0.75	0.44	0	1
Residential Crowding	1.38	0.41	0	6
Number of Siblings	1.38	1.01	0	11
Biological Mother's Age at First Birth	28.15	4.96	14	54
PMK Level of Depression	4.75	5.60	0	35
EA Type				
Low Adult Employment, Low Income, Low Education	0.01	0.12	0	1
Low Youth Employment, Low Education	0.04	0.20	0	1
High % Single Parents and Immigrants, Low Income, Low Employment	0.06	0.24	0	1
High % Single Parents and Immigrants	0.09	0.28	0	1
Lower Middle Class	0.29	0.46	0	1
Middle Class	0.19	0.40	0	1
Upper Middle Class	0.25	0.43	0	1
Very High Socio-economic Status	0.06	0.23	0	1
PMK Perceived Problems in the Neighbourhood	1.31	1.67	0	10
Census (EA) Percentage Home Owners	71.40	22.62	0	100
Census (EA) Percentage Immigrant	14.70	13.77	0	91
Census (EA) Concentrated Advantage	0.58	2.03	-3	10
Census (EA) Concentrated Disadvantage	-0.35	2.81	-6	20
Census (EA) Adult/ Child Ratio	2.57	1.14	1	37
Census (EA) Neighbourhood Density	2.90	0.44	1	7
PMK: Neighbours Score	10.70	2.78	0	15
PMK: Neighbourhood Safety	4.30	1.28	0	6

Table A2 **Descriptive Statistics at the Child Level of Analysis for Indirect Aggression Analyses**

	Mean	Standard Deviation	Minimum	Maximum
Indirect Aggression	1.20	1.68	0	10
Female	0.49	0.50	0	1
Child's Age	7.47	2.29	4	11
Hostile/Punitive Parenting	13.73	5.20	0	36
Positive Interaction	12.80	3.05	1	20
Consistent Parenting	14.82	3.47	0	20
Exposure to Violence in the Home	1.11	0.40	1	4
Household Socio-economic Status	-0.04	0.77	-3.16	2.82
Recent Immigrant (past 4 years)	0.02	0.15	0	1
Immigrant (5-9 years)	0.04	0.19	0	1
Blended Two Parent Family	0.06	0.23	0	1
Single Parent Family	0.15	0.35	0	1
Two Biological Parents Family	0.79	0.40	0	1
Years Lived at Current Address	6.21	5.24	0	48
Home Ownership	0.75	0.43	0	1
Residential Crowding	1.38	0.41	0	6
Number of Siblings	1.45	1.01	0	11
Biological Mother's Age at First Birth	27.92	4.88	14	54
PMK Level of Depression	4.67	5.63	0	35
EA Type				
Low Adult Employment, Low Income, Low Education	0.01	0.12	0	1
Low Youth Employment, Low Education	0.04	0.20	0	1
High % Single Parents and Immigrants, Low Income, Low Employment	0.06	0.23	0	1
High % Single Parents and Immigrants	0.09	0.28	0	1
Lower Middle Class	0.30	0.46	0	1
Middle Class	0.19	0.39	0	1
Upper Middle Class	0.26	0.44	0	1
Very High Socio-economic Status	0.06	0.23	0	1
PMK Perceived Problems in the Neighbourhood	1.31	1.65	0	10
Census (EA) Percentage Home Owners	71.86	22.20	0	100
Census (EA) Percentage Immigrant	14.59	13.74	0	90
Census (EA) Concentrated Advantage	0.61	2.06	-3	10
Census (EA) Concentrated Disadvantage	-0.40	2.75	-6	20
Census (EA) Adult/ Child Ratio	2.57	1.12	1	23
Census (EA) Neighbourhood Density	2.91	0.44	1	7
PMK: Neighbours Score	10.75	2.77	0	15
PMK: Neighbourhood Safety	4.33	1.27	0	6

Table B.1 **Correlations Among Individual, Family, and Neighbourhood Independent Variables with Childhood Aggression**

	Outcomes	
	Indirect Aggression (4-11) N=10,971	Physical Aggression (2-11) N=14,287
Independent Variables		
Female	0.07***	-0.12***
Child's Age	0.13***	-0.11***
Hostile/Punitive Parenting	0.28***	0.39***
Positive Interaction	-0.15***	-0.01
Consistent Parenting	-0.14***	-0.13***
Exposure to Violence in the Home	0.10***	0.13***
Household Socio-economic Status	-0.10***	-0.08***
Recent Immigrant (past 4 years)	-0.02*	-0.04***
Immigrant (5-9 years)	0.03**	-0.03***
Immigrated over 10 years ago	-0.01	-0.07***
Blended Family	0.05***	0.02*
Single Parent Family	0.10***	0.09***
Two Biological Parents Family	-0.12***	-0.09***
Years Lived at Current Address	-0.04***	-0.08***
Home Ownership	-0.09***	-0.07***
Residential Crowding	-0.04***	0.01
Number of Siblings	0.00	0.05*
Biological Mother's Age at First Birth	-0.10***	-0.06***
PMK Level of Depression	0.20***	0.16***
Census EA Type		
Low Adult Employment, Income and Education	0.02*	-0.00
Low Youth Employment and Education	-0.00	-0.01
High % Single Parents and Immigrants, Low Income, Low Employment	0.04***	0.01
High % Single Parents and Immigrants	0.00	0.02*
Lower Middle Class	0.04***	0.00
Middle Class	-0.01	0.03***
Upper Middle Class	-0.02*	-0.02
Very High Socio-economic Status	-0.05***	-0.05***
PMK Perceived Problems in Neighbourhood	0.09***	0.11***
Census (EA) Percentage Home Owners	-0.04***	-0.01
Census (EA) Percentage Immigrant	0.00	-0.07***
Census (EA) Concentrated Advantage	-0.06***	-0.07***
Census (EA) Concentrated Disadvantage	0.05***	0.03***
Census (EA) Adult/ Child Ratio	-0.04***	-0.04***
Census (EA) Neighbourhood Density	-0.00	-0.03***
PMK: Neighbours Score	-0.09***	-0.07***
PMK: Neighbourhood Safety	-0.06***	-0.07***

Notes: †=0.10 (two-tailed tests of statistical significance), *=p<0.05, **=p<0.01, ***=p<0.001. All correlations use a normalized weight to retain the effective sample size while adjusting for the research design.

Table B2 **Correlations Among Census-Tract Level Variables** (96 CT Units)

	Percentage Low Income Families	Census Tract Population	Census Tract Level of Collective Efficacy
Percentage of Low Income Families per CT	—		
CT Population	-0.04	—	
CT Level of Collective Efficacy[a]	0.34***	-0.01	—
CT Level of Perceived Neighbourhood Problems[b]	-0.24*	0.16	-0.27**

*=p<0.05, **=p<0.01, ***=p<0.001 (two-tailed tests of statistical significance), a=coding on this variable indicate high scores with low levels of collective efficacy, b=coding on this variable equates low scores with high tract level problems.

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